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The Railways of Peru.

BY PROF. JAMES ORTON.

PERU has just found out that this is an age of roads, and that, if she would not fall too far behind in the race of nations, she must have means of inter-communication. No other country has greater need of highways, for the two agricultural regions, the interandean plateau and the eastern transandean slope ("Montana") are separated by the oriental cordillera, and the mineral region is cut off from the agricultural by the coast range, while no navigable streams enter the Pacific. The Incas constructed some remarkable roads, chiefly longitudinal—one passing over the grand plateau from Quito to Cuzco; another along the coast. The latter is quite effaced by the shifting sands; a fragment, however, is still visible at Pacasmayo. The remains of the other bear evidence to their primitive grandeur, and have drawn forth the eulogium of Humboldt, that "the roads of the Incas were among the most useful and stupendous works ever executed by man." But these old roads are now useless, and, even if repaired, would be unsuited to modern commerce. What Peru wants, and what she is trying to accomplish, is a system of transverse railways, bringing her rich highland valleys in connection with her ports, and a longitudinal line, eclipsing the royal road of the Incas, which shall link all together, passing from Jacu through Cajamarca, Cerro de Pasco and Cuzco to Lake Titicaca.

PRIVATE ENTERPRISES.

The following railways are owned by private companies: "Lima and Callao," eight miles, finished. This is the oldest road in Peru, having been opened in 1851, and the best paying; yet, like all the rest, it has but one track. "Lima and Chorillos," the Long Branch of Peru, nine miles, finished. "Eten and Lambayaque, 50 miles, half finished, starting from an iron pier 4,000 feet long. 'Arica and Tacna," 40 miles, finished. A continuation to La Paz is projected, to cost $32,000,000, to rise 14,000 feet; this would be the nearest outlet for Bolivia, but would have a rival in the Arequipa and Puno road. "Iquique and Pisaqua," 160 miles, half finished; designed solely for the exportation of salitre. There are also short roads constructing at Pimental, Trujillo and Patillos.

GOVERNMENT RAILWAYS.

Peru has invested about $140,000,000 in railways—a gigantic sum for three millions of people; but guano is the exchequer. Of this amount she has paid nearly one half; and 620 miles of track have been laid. It costs fifty per cent. more to build a railway in Peru than in the United States; for every thing must be imported, and labor costs double. Among the minor roads owned by the Government are the "Pisco and Ica," 45 miles, finished, cost $1,500,000; "Ancon," finished from Lima to Chancay, 45 miles, cost about $3,000,000; "Payta and Piura," 60 miles, just begun, to cost $1,950,000.

But all the great iron roads of the Republic are the handiwork of Mr. MEIGGS, the best representative of American enterprise below the equator. Mr. MEIGGS has contracts with the Government amounting to $133,000,000, for building seven railways. Two of these are finished; while the remaining five, the longest and most difficult, are in process of construction at the same time. Unlike many of our Governmental works, these railways are models; one must travel around the globe to find better laid tracks, more finished bridges, culverts and mason work, more remarkable cuts and fills, and greater achievements of engineering skill. In the minutest details the work is of the best description, very often much better than the contract calls for; Mr. MEIGGS preferring to maintain, at any cost, what he has already gained, the reputation of being an honorable contractor. If he is ever unjust, it is towards himself. The station-house at Chosica, *e. g.*, is so elegant that President Pardo declared he would like such a residence for himself.

The gauge of all the roads is 4 ft. 8½ in., save that of Chimbote, which is 3 ft. The rolling stock is American, the cars coming from GILBERT, BUSH & Co., Troy, and the locomotives, mostly ROGERS, from Patterson. A locomotive on the track costs from $20,000 to $25,000, and a first-class car $5,500. The ties are from Oregon, the rails from England, the diamond drills from America, worked by RAND & WARING'S compressor, and the stationary machinery from Leeds. The shops and depots generally are made of English galvanized iron, the shovels are AMES'S, and the iron water tanks are PITT'S patent. The engineers are invariably, I believe, English-speaking, and the laborers are Chinese, Cholos and Chilenians. Peruvians may be proud of their guano, but certainly they cannot hold up their heads when they remember that not a thing has entered into the construction of their railways but what is foreign, save, perhaps, dirt, stones, lime and powder, which last article, so indispensable, Mr. MEIGGS is obliged by contract to buy of the Government. The timber, iron, rolling stock, labor, fuel, and nearly all the food, are imported. Even the money which pays for it is foreign—bank bills engraved in New York, and Bolivian silver!

It will be a long time before the Government will realize anything directly from these railroads. The Chimbote, passing through a developed mining region, and the "Ilo," draining the vineyards of Moquehua, will soon be self-supporting. But such a costly enterprise as the "Oroya" can do nothing but expend, until it is extended to the Amazons, while as to the "Arequipa," one is in doubt whether to wonder most at the skill of the engineers or the hardihood of the Government in ordering the gigantic undertaking, for it passes through an utterly profitless region—one village in one hundred miles—over sterile pampas and black paramos, without mines worth the working, without a sign of life save now and then a condor, a few herds of "Peruvian sheep" and scattered tufts of wiry grass, cacti and compositæ. The great export from Southern Peru, alpaca, does not exceed 10,000 quintals a year. Surely, we say, the Government will not have a month's work for this road in a year. But so would we misjudge our Pacific Railroad as it crosses the Great Desert. When the "Arequipa Railroad" shall be connected with the heart of Bolivia, and thence with the projected lines in the Argentine Confederation, we shall look for dividends. The railroads of Peru, as everywhere else, will develop new life in the people, and new sources of wealth in the country.

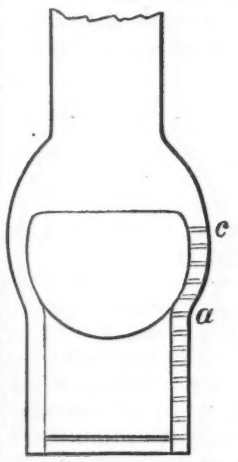
But letting Peru look after the proceeds, let us glance at these great enterprises as marvels of engineering and as the creations of American genius.

TO BE CONTINUED.

Broken Stay Bolts.

BY W. S. AYRES.*

THE boiler from which these stay bolts have just been obtained was that of the locomotive Catasauqua, L. V. R.R., built at the company's shops, South Easton, Pa., in 1864. The iron is Lowmoor, and has been in use nearly ten years.



The majority of the broken bolts were found to be along the curve of the shell, from *a* to *c*, and in all cases observed, were broken just *inside* the *shell*, and in no case *next* the *fire-box*.

The iron has become highly crystallized from some cause, and is very brittle, only requiring three blows of an ordinary machinist's hammer to break the sample.

On the other hand, when annealed it is remarkably *tough*, as shown by the doubled sample herewith presented. All of the fractures seem to have been of slow procedure, beginning at the top of the bolt, gradually working deeper and deeper until the pressure of steam overcame the tenacity of the remaining parts. Unequal contraction and expansion of the parts of the boiler seems in this case to be the only existing cause for a fracture in the stay bolts; and the fact that these fractures begin at the top of the bolt seems to be worthy of notice.

SOUTH EASTON, PA., February, 1874.

Narrow Gauge Railroads.	Miles built.	Total length.
In the United States	1,025	3,759
In Canada	402	791
Total	1,427	4,550

THE engine, boiler and shaft houses of the Alaska Shaft (Philadelphia and Reading Coal and Iron Company) of Mount Carmel, Pa., were burned on the 15th March. They were in course of erection.

* A communication to the American Institute of Mining Engineers, read Feb. 26, 1874.

American Institute of Mining Engineers.

NEW YORK, THURSDAY, FEBRUARY 26, 1874.

MORNING SESSION.—The President called for a paper by Mr. THOS. S. BLAIR, of Pittsburgh, on Direct Processes of Iron Manufacture. This paper, which will be published in an early number of the Journal, aroused a great deal of interesting discussion, at the close of which

Mr. OSWALD J. HEINRICH read a paper on Exploration by means of the Diamond Drill, and exhibited rock sections from borings at the Midlothian Colliery, Virginia. The morning session then adjourned.

AFTERNOON SESSION.—The Institute met again at 3 P. M., and after discussion of Mr. HEINRICH'S paper,

Mr. E. B. COXE of Drifton, Pa., described some improvements in measuring in mine surveying.

Mr. E. C. PECHIN read a paper on the late explosion at Dunbar Furnace (published last week). In regard to this subject Mr. FIRMSTONE said: "There was an explosion quite as disastrous at the North Pennsylvania furnace, about five miles from Bethlehem, but in that case a tuyere leaked. The vagary spoken of by Mr. PECHIN, of the gas going back into the blast pipes instead of going out of the top of the furnace, is with us the rule in an anthracite furnace. It is important to have the escape valves near the furnace, and between it and the ovens. The rule with us is, that the machinery should never stop without first taking down the belly pipes. We also have valves over each tuyere, but these don't suffice to carry off all the gas. It is further necessary to have an additional valve in the main pipe. The automatic valve is certainly a valuable and efficient contrivance."

Prof. T. STERRY HUNT read a paper on the Coals of the Hocking Valley, Ohio.

Mr. W. P. BLAKE read a paper on Hydraulic Forging of Iron and Steel as practiced at the shops of the State Railway, Austria. This paper will be found in the JOURNAL of March 14, 1874.

In concluding the session, the President briefly congratulated the Institute on the valuable collection of data that the members were making in the various branches of mining and metallurgical industry.

EVENING SESSION.—Prof. J. C. SMOCK read a paper upon the Distribution and Occurrence of the Iron Ores of New Jersey. After an animated discussion,

The PRESIDENT read a short communication from Mr. W. S. AYRES of South Easton, Pa., on the breaking of stay bolts in a locomotive boiler built at the L. V. R. R. Company's shops.

Mr. JOHN M. ADAMS, late of the Owyhee Mill, Silver City, Idaho, read in part a paper on the Washoe Mill Process in its economical relations. This paper was not finished when the meeting adjourned.

The Mount Lincoln Smelting Works at Dudley, Colorado.

* BY EDWARD D. PETERS, JR., M. E.

IT frequently occurs in the establishment of reduction works in an entirely new and untried mining district, that the metallurgist in charge finds considerable difficulty in determining the process best adapted to the ores which he receives for treatment.

At the first glance it would seem easy enough to decide what style of furnace is best adapted for beneficiating any one class of minerals. If the ore possessed a quartzose gangue and was comparatively free from base metals, while salt could be obtained at a reasonable price, one would naturally resort to chloridizing, roasting, and pan or barrel amalgamation for the extraction of its silver contents. If galena or carbonate of lead was the prevailing mineral, and charcoal could be obtained at moderate figures, the blast furnace would beneficiate the ores most advantageously. But if, as is usually the case in Colorado, the ores consisted of an intimate mixture of galena, zinc blende, copper pyrite, and noble silver minerals, associated with an overwhelming mass of silicious heavy spar, or limestone gangue, the common reverberatory furnace can be used to the greatest advantage; and, although the product is only a copper matte, I do not hesitate to affirm that it can be treated, and the silver, gold and copper produced at nearly the same price for which silver and lead can be separated. In Germany, blast furnaces are frequently used for this same purpose, both for argentiferous and non-argentiferous copper ores; but any one who will take the trouble to examine the statistics of smelting at Fahlun, the Oberharz, and other continental works of this description, will see that the expenses are far too great, and the production much too small to think of employing this method in our mining districts, where only the softest and most miserable kind of charcoal is obtainable.

I propose in this paper to give an accurate account of the expenses incurred at the Mount Lincoln Smelting Works in treating the same kind of ore, and producing the same end-product in both blast and reverberatory furnaces. I have taken for comparison a favorable campaign of the blast furnace, and a good average month's running of the reverberatory. In the blast furnace estimate I have included the calcining and concentration of the matte produced during that campaign, as I always, when possible, concentrated the regulus made in each run at the end of the same, without any stopping or repairing of the furnace. It is proper that this expense should be included in the estimate, as it required a concentration of the blast furnace matte to bring it up to the same value as the reverberatory raw matte.

I will mention that our average matte contained 1100 oz. silver, 3 oz. gold, and 30 per cent. copper. The following analysis represents the ore that formed our principal supply:

Ba O, SO_3	55 per cent.	PbS	5 per cent.
Ca O, CO_2	15 "	ZnS	5 "
SiO_2	20 "		
Total			100

It will be seen that the sulphate of baryta formed the principal constituent of this ore, and in connection with the iron ores used for fluxes, formed in the blast furnace a much larger quantity of matte than was desirable. In the reverberatory, however, the chemical reactions between barite, pyrite and silica are entirely different. Very much less matte is formed and the concentration proceeds faster. I have no works to which I can refer for a complete explanation of these reactions, but suggest the following:

$$2BaO, SO_3 + 2SiO_2 + FeS = 2BaO, SiO_2 + FeO, SiO_2 + 3SO_2.$$

One other great advantage that I can point out for the reverberatory is, that much less flux suffices than for the blast furnace, as the slags are raked out through the skimming door, and can consequently vary very much in their composition without interfering with the progress of smelting. In the blast furnace, on the contrary, a slight excess of silica will form long noses and perhaps wall accretions, and frequently derange the running of the furnace for twenty-four hours.

But perhaps the most important point of all is that the reverberatory is fitted for using raw fuel. Any smelter who has been forced to burn his charcoal from the spruce and fir of Utah and Colorado will fully appreciate this immense advantage. While the two kinds of wood mentioned produce charcoal that is hardly better than carbonized sawdust, they form in their raw state a most admirable fuel, giving a long and intensely hot flame, and comparing favorably for this purpose with the oak and hickory of the East.

But I will proceed at once to give the promised figures, and allow my hearers to deduce their own conclusions therefrom. The blast furnace used was 36"x42" inside measurement, and 10'.6" from tuyeres to charge hole. Six tuyeres were used, with 1¾" nozzle, and a No. 7 Sturtevant blower supplied the blast. I have reduced all time spoken of, to shifts of 12 hours each.

ORE SMELTING IN BLAST FURNACE.

30 DAYS OR 60 SHIFTS.

Brasque.			*Fluxes.*		
2 loads clay	$6 00		1.8 tons roasted pyrite at $14 30	$25 74	
60 bushels refuse coal	3 00		Scrap iron, lime, etc	85	
Stamping and mixing	21 50		48 shifts, at	$26 59	$1,276 32
Total		$30 50	*Losses.*		
Packing and Drying.			3.7 tons slag assaying, 4.3 oz. Ag	$15 91	
3 men, 2 shifts (packing)	$26 00		48 shifts, at	$15 91	$763 68
1 man, 3 shifts (drying)	12 00		*Miscellaneous Expenses.*		
Charcoal brands and wood	7 50		1 man wheeling charges, half-time.		
120 red brick for front, and labor	4 40		48 shifts, at $2 00		$96 00
Total		$49 90	Oil, lights and candles		61 00
Fuel.			½ office expenses		333 33
Filling up furnace, 200 bushels, 48 shifts smelting, averaging 4 5 tons charge per shift, at 56 bushels per ton	12,096		Wear on tools, tuyeres, etc		68 00
⅓ extra for waste	4 099		During the above campaign there were produced 58.3 tons of regulus, which was crushed, calcined and smelted through with sandstone flux at the end of the ore campaign, and before the furnace was blown out. The expenses of matte concentration were as follows:		
Bushels coal (at 15c.)	16,395	$2,459 25	Breaking and transporting to crusher (estimated)		$24 00
Labor.			Crushing		62 50
1 smelter	$5 00		Calcining (58 shifts, at $7 12)		412 96
1 helper	4 00		Charcoal		517 44
1 charger	4 00		Labor		181 12
1 coal roll r	3 00		Blower		73 18
¼ blacksmith	1 25		Flux (12 tons sandstone, at $46 15		49 80
48 shifts, at	$17 25	$828.00	Oil, lights, office, etc		162 00
Blower.			*Blowing out and Repairing.*		
¾ engineer	$3 75		4 men, 4 shifts, at average of $4 40		70 40
¾ wood for engine	2 40		Mason, 3 shifts, at $6		18 00
¾ oil and lights	45		Helper, " $3		9 00
¾ repairs, etc	37		320 fire brick, at $240 per M		76 80
48 shifts, at	$6 97	$334 56	1,100 lb. fire clay, at $60 per ton		33 00
Crusher.			Extra labor, cleaning up, etc		10 50
Running ½ time, reduced to 48 shifts.			Grand total		$8,243 16
¼ engineer	$1 25				
¼ wood for engine	80				
¼ oil and lights	15				
¼ repairs, etc	12				
½ repairs on crusher	72				
½ man to feed	$2 00				
48 shifts, at	$5 04	$241 92			

I have estimated no losses from the matte concentration, as the slag therefrom contained a large percentage of iron, and is used over with ores forming a valuable flux.

The amount smelted per shift averaged 4.5 tons of charge, or 2.7 tons of ore; making for 48 shifts a total of 129.6 tons of ore, costing to smelt into marketable regulus $63.61 per ton. If it had not been for the unfortunate occurrence of

* A paper read at the New York meeting of the American Institute of Mining Engineers, February 27, 1874.

heavy spar in the ore, the matte concentration could have been omitted, and the cost of smelting would have been reduced to $52.16 per ton.

In August, 1873, I built for the company a common reverberatory, which ran steadily until January 25, of this year. It is now standing idle for want of ore. The hearth is 15 feet long, by 9½ feet wide, and accommodates about 2¾ tons of ore at a charge. As the furnace requires a new hearth and extensive repairs only once in 6 to 9 months, I have charged the single month's running with 1-6 of this expense. In 30 days, or 60 shifts, the furnace loses on an average three shifts. The ores require no calcining, and the matte produced is sufficiently rich for shipment. At present, however, I am separating it in the wet way with satisfactory results, and at a very moderate expense. The cost of smelting is given in detail below:

ORE SMELTING IN THE REVERBERATORY.

30 DAYS OR 60 SHIFTS.

1-6 expenses of putting in hearth		$41 00	*Fluxes.*		
Average repairs for 60 shifts		29 50	0.6 tons pyrite at $14 30	$8 58	
Fuel.			Lime, etc	30	
4¼ cords wood per shift, at $3 50	$14 87		57 shifts, at	$8 88	$506 16
57 shifts, at	$14 87	$847 60	*Losses.*		
114 bushels charcoal, at 15c		17 10	2,6 tons slag, assaying 7.5 oz. Ag	$19 50	
Labor.			57 shifts, at	$19 50	$1,111 50
1 smelter	$5 00		*Miscellaneous.*		
1 helper	4 00		Wheeling charges		$114 00
1 fireman	4 00		Oil, lights, etc		79 60
57 shifts, at	$13 00	$741 00	½ office expenses		333 33
Crusher.			Wear on rabbles, tools, etc		132 00
Same as for blast furnace	$5 04		*Regular Repairs.*		
57 shifts, at	$5 04	$287 28	300 lb. clay, 400 lb. quartz, 57 shifts, at $3 35		$190 95
			1-6 blowing out and repairing		57 00
			Grand Total		$4,488 02

During this campaign of 57 working shifts there were smelted 153.9 tons of ore, yielding 19.4 tons of very rich regulus. The actual cost of producing the same was $29 16 per ton. This shows an enormous saving in the use of the reverberatory furnace, and for several months the blast furnace has lain idle, except when engaged in smelting through small batches of lead ores.

I make no further comments on the subject, but simply reassert that all the above figures are from actual work, and can be accepted as reliable.

Absolute Temperatures.

BY RICHARD H. BUEL, C. E.

FAHRENHEIT, in graduating his thermometric scale, placed the zero point to indicate the lowest temperature that he was able to produce. On the Centigrade scale, the zero point corresponds to the temperature of melting ice. Neither of these is a point of absolute zero, of course, since much lower natural temperatures are known to exist, and can readily be produced by artificial means. Hence, in either of these scales, it is impossible to tell the ratio of the temperatures of two substances. For instance, if the temperature of one piece of iron is 50° Fahrenheit, and that of another 100°, it cannot be said that the second piece is twice as hot as the first, because the temperatures are not measured from the starting point, or absolute zero. Thus, if the absolute zero were 400° below the zero of Fahrenheit's scale, the temperatures of the two pieces of iron would be 450° and 500°, respectively, and the second piece would be 1 1-9 times as hot as the first. It will be seen, then, that for comparisons of the relative temperatures of different substances, it is convenient to measure them from the absolute zero, or point where all heat motion ceases. This point has never been reached by experiment, and only exists in theory—its existence being based on the supposition that, as permanent gases expand when their temperature is increased, and contract when the temperature is diminished, if the pressures are maintained constant during the experiment—or have their elasticities increased or diminished, by increase or diminution of temperature, the volumes remaining unchanged during heating or cooling—there must be a point at which the elasticity will disappear, or the substance will cease to exist as a gas. The lowest temperature produced by experiment, was obtained by WATTERER who, by evaporating a mixture of liquefied nitrous oxide and bisulphide of carbon in a vacuum, reduced the temperature to 220° below the zero of Fahrenheit's scale. At this temperature, alcohol, which has never been frozen, became so thick that a glass containing it could be inverted.

By the application of pressure at low temperatures, FARADAY succeeded in liquefying all known gases except oxygen, hydrogen, nitrogen, nitric oxide, carbonic oxide, and marsh gas, which are commonly called permanent gases. These permanent gases have been subjected to enormous pressures without changing their condition—but the results of experiments on their expansion and contraction caused by changes of temperature give data from which the theoretical temperature of liquefaction can be determined. For this theoretical determination, it is desirable to obtain the results of observation in the case of a perfect gas, or one in which every particle moves as freely as if no other particles were present. No perfect gases are known to physicists, but air very nearly satisfies the conditions, and hence the results obtained from experiments with air are generally used in the investigation of the action of a perfect gas.

The coefficient of expansion of a gas usually expresses the amount of expansion between the temperatures of melting ice and boiling water, at constant pressure or constant volume.

The coefficient for constant pressure means the amount the volume increases between the limits of temperature named above, if the pressure does not change.

The coefficient for constant volume refers to to the change in pressure between these limits of temperature, if the volume does not change.

GAY-LUSSAC concluded, as the result of his experiments, that the expansion of all gases, between the freezing and boiling points of water, was 0·375 of the original volume or pressure. These results were subsequently confirmed by DULONG and PETIT. But RUDBERG, the Swedish physicist, found that this number was too high—his experiments with air having shown that the expansion between the given limits was:

Under constant pressure	0·3648
" " volume	0·3646

The mean of a great number of experiments by REGNAULT gives the following as the expansion of air between the limits of temperature named above:

Under constant pressure	0·367
" " volume	0·3665

The coefficients for other gases vary slightly, and those for air change somewhat with the pressure—showing that these coefficients only approximate to those of an absolutely perfect gas.

Professor RANKINE assumes from these experiments that the co-efficient for a perfect gas is 0.365, under constant pressure and constant volume. So that, if the product of the temperature and pressure at the freezing point of water be taken as unity, the product of these two factors at the temperature of boiling water will be 1.365. Now the absolute zero is supposed to be a point at which the gas is liquefied, so that the product of the pressure and volume at that temperature will be zero. It appears that the value of this product increases by 0.365, for an increase of temperature of 180 deg. Fahrenheit (from 32 to 212 deg.), or 1-180th of this amount=0.0020276=$\frac{1}{493.2}$, on being heated one degree. Similarly on being heated one degree, the value of the product of pressure and volume would be diminished $\frac{1}{493.2}$. Hence, to diminish the value of this product to zero, or to liquefy the gas, the temperature must be lowered 493.2° below the freezing point of water, or 493.2°−32°=461.2° below the zero of Fahrenheit's scale.

On the centigrade scale, the product of the volume and pressure is diminished 0.00365=1-274th for each degree that the temperature is lowered. Calling P the pressure and V the volume at 0 deg. centigrade, the value of the product of the pressure and volume at a temperature of −1 deg. will be 273-274×P×V. It is easy to see, then, that to liquefy the gas, supposing the law to remain the same as the temperature is lowered, it must be cooled to a point 274 deg. below the zero of the centigrade scale.

The point of absolute zero, as determined above, 461.2° Fah., or 274° centigrade, is that used by Professor RANKINE and other writers on the thermo-dynamics. Some physicists, however, employ a different value, deducing it from the co-efficient of expansion of air under constant volume, as determined by REGNAULT. From this value it appears that the product of the pressure and volume of a perfect gas at the temperature of melting ice, is diminished $\frac{1}{491.1}$, for a reduction of temperature of one deg. Fahrenheit, or $\frac{1}{272.1}$, for a reduction of temperature of one deg. centigrade. On this supposition, the absolute zero is fixed at −459°.1 Fah., or −272°.9 centigrade. It is customary for those who employ this value of the co-efficient, to fix the absolute zero at the nearest whole number on the centigrade scale, or—273 deg. and to deduce therefrom the corresponding position on Fahrenheit's scale,—273°×1·8+32°=459°.4. It is believed that the publication of these results will be useful, in explaining how the different positions of the point of absolute zero, as used by various writers, are obtained. It will be observed, in either case, that the result is entirely theoretical, requiring two assumptions that have not yet been verified by experiment:

1st. That the co-efficient of expansion, as obtained for air, is true in respect to a perfect gas.

2d. That this co-efficient is constant for all ranges of temperature.

It seems probable, however, that the results obtained by either method are a close approximation to the truth. To convert observed temperatures into absolute temperatures, it is only necessary to add 274 or 273 deg. to the observed temperature on the centigrade scale, or either 461°.2 or 459°.4 to observed temperatures on Fahrenheit's scale. A few standard points on the different scales are given below:

	Absolute scale.		Fahrenheit scale.	Centigrade scale.
Absolute zero	0°	Fah. or cent.	−461°.2 or −459°.4	−274° or −273°
Melting point of ice	−493°.2 or −491°.04	Fah	32°	0°
	−274° or −273°	Cen		
Boiling point of water under one atmosphere	673°.2 or 671°.4	Fah	212°	100°
	374° or 373°	Cen.		

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IN the launch of the great iron steamship *Peking* at Chester, Pa., last week, the iron trade may fairly see the first signs of a future prosperity. Iron ship-building seems to have gained a firm foothold on the Delaware, and with a fair degree of success in the re-installment of our commerce, this industry will rapidly become an important consumer of iron. The metal worked into one steamer does not bear a very notable proportion to the year's product of the country; but the revival of commerce in American bottoms, especially if carried on in iron ships, would have a wonderful effect upon this in common with many other trades; and we know that business men of all kinds are looking to the fate of the experiment now taking place on the Delaware with great hope. Only a few days ago one of the new ship-building firms, Messrs. CRAMP & SONS, suffered serious loss by fire, but their business will be only temporarily hindered by the mishap.

THE Secretary of the Quicksilver Mining Company of New Almaden, Cal., Mr. MAHANY, has received a model of the celebrated mines at that place, from which so much of the world's quicksilver has been obtained. It is a new device, like some shown at Vienna, consisting of twenty-six sheets of glass, placed an inch apart, and each bearing a section of the mine, drawn in black, with the ore *labores* marked in red. This is not only a beautiful but an extremely suggestive mode of representing mining works. The direction of the deposits and their relation to the surface are shown with a clearness that leaves nothing to be desired, and though done in glass and ink, the relief of the surface contour and the outlines of the ore deposits are strikingly marked. Mr. MAHANY will cheerfully show this model to callers at his office, 19 Nassau street, and we advise Eastern engineers, who have not seen this method of illustrating mining works, to pay him a visit. The surveys from which it has been constructed were directed by Mr. HENRY JANIN, and the model itself is the work of Mr. C. T. HEALY, the surveyor. The annual meeting of the Quicksilver Mining Company was held last month, and we learn from the Secretary's Report that the last year was a very successful one, financially. The gross earnings were $827,169 and the expenses $398,666, leaving $428,503 as profit. In regard to the future the company has one favorable and one unfavorable prospect. The former is the close of the old MILLS contract at $50 per flask, leaving the company free to sell its metal at the high rates now prevailing. The ore, however, has not proved rich during the year, averaging 7·86 per cent. from the mine, and 4·87 per cent. when the poor washed *tierras* are mixed in. This state of things is, however, by no means necessarily permanent, and prospecting is actively carried on, in the expectation of finding new bodies of ore. A continuous shaft furnace has been built for the purpose of treating the poor ores at small expense, and in addition to this the condensers have been enlarged and now work very perfectly.

The Holly Water System—Almost an Awful Warning.

THE following telegram appeared the other day in the New York papers:

BINGHAMPTON, N. Y., March 10.—A boiler at the city water works exploded this morning at half-past eight o'clock, blowing the boiler house to atoms and killing DAVID J. SMITH, the engineer. Pieces of the machinery and building were scattered a distance of one thousand feet, the body of the engineer being blown a hundred feet.

The city is at present without water, but the two boilers which are left will be put in operation as soon as the rubbish has been cleared away and the necessary repairs made, which the Superintendent thinks will take twenty-four hours. The total loss is estimated at ten thousand dollars. The Holly pumping machine is not much injured.

The water works are the chief dependence against fire, and the Mayor has called a special meeting of the Common Council, to appoint a large special police force to patrol the streets and watch for fires. A very strong West wind is blowing.

Binghampton is supplied with water by what is known as the "direct system"—sometimes as the HOLLY system; a gentleman of that name having been principally instrumental in its introduction, and being the patentee of several contrivances used in connection with it. It is very simple, consisting in an engine, which forces the water directly into the distributing mains, under a pressure varied to suit the varying demand as to quantity and power. There is no reservoir; when the engine stops, the water stops; when more water is wanted, the engine must work harder, or another engine must be started to help it. The telegram above quoted affords a striking indication of the inadequacy of this kind of supply; and since a good many other towns have been persuaded into this dangerous position, we make the narrow escape of Binghampton our text for a short sermon on this subject.

It needs no argument to prove that the water supply of a city should be made as permanent and reliable as human forethought and skill can make it. The old dependence on wells and cisterns is soon superseded by the general introduction of water into a town, and nothing remains as even a feeble dependence in case of interruption to the general supply. A city, the water works of which are suspended in operation, is thus worse off for the time than if it never had had any; and the more complex and complete the system has become, the greater is the misery caused by its sudden suspension. Only the withdrawal of food or air could surpass this evil. Where the water supply is relied on, not only for consumption, but for floating off the sewage and refuse products and for extinguishing fires, pestilence and conflagration as well as famine are threatened by its loss. Is any imagination vivid enough to depict the consequences of such a failure in our metropolis?

But we need not argue the importance in this matter of the most extreme and anxious protection against even the possibility of accident. No penny-wise policy finds a proper place here. The question should be, What is the best and safest thing to do? How shall we most surely avert the danger of interruption, bringing so many awful perils and certain evils in its train? Serious consequences these, of ill-advised, ignorant, or penurious dealing with an all-important subject.

Think of Binghamton as it stood on the night of March 10th, and "a very strong west wind blowing," with nothing to do in case of fire but to stand inactive, and see the city burn.

Prudent engineers of the old time used to look askance at any system of water supply except the "gravity system," by which, as in the case of the Croton, the Cochituate, and several other important works, the water is brought from a distance, and flows through the town by natural pressure due to the higher level of the supply. As such sources of supply are not always (indeed, not often) available, the next dependence is upon steam or water power for elevating water into a reservoir, to which the town is connected. In all first-class works of this kind complete duplication of the machinery is insisted upon, and a reservoir of such ample size as will insure a supply to the town, during such time of interruption as must inevitably now and then occur. And it has come to be understood that a reservoir can hardly be too large to meet the requirements of safety.

The reservoir system has another safeguard. Accidents are liable to be produced by the constant jar of the engines upon the pipes with which they are immediately connected. The interposition of the reservoir confines this trouble to the single pipe leading from the engine thereto, allowing all the circulation through the city to be dealt with only by the steady and equable reservoir pressure. When it is understood that no system or style of piping can long endure the pulsation of a hard-working pump without injury to the joints, or, perhaps, fracture of the material itself, the limitation of the mischief to a single pipe becomes all-important.

Let us look somewhat critically at the "direct system," and see whether it should not be stigmatized as a step of retrogression rather than of advance in the science of water-supply for towns and villages.

What does it propose to do that has not been done? Palpably nothing. It only takes away the great dependence—the storage reservoir. For every gallon that is used, a corresponding gallon must be pumped; for every additional pound of pressure required for fires, an additional pressure must be brought upon all the pipes, water backs and fixtures within the houses. All the plumbing is thus severely and suddenly taxed. When it is remembered that the natural level of the Croton is somewhere about the top of Trinity Church steeple, some idea of the loss of head incurred by friction and lateral draft may be obtained. Think of putting on enough extra pressure (about 100 lb. per square inch) at High Bridge to make the stream at the Battery effective for fires. Can any one doubt that such an attempt to propagate pressure to the remote parts of the circulation would be followed by the destruction of the proximate parts? And such destruction threatens, in proportion to their size, all towns in which the pipes of distribu-

tion are converted into hose pipes for fire purposes. Let but one joint fail, one weak pipe burst, in any of the numerous ramifications in and out of houses, factories, stables, streets and lanes, and the fire may rage unchecked. Or let one of the many things happen to engine and boiler which may, must, and will happen—requiring a few minutes, perhaps a few hours, perhaps a few days for their repair—and the same serious consequences may ensue. The result may perhaps be even the destruction of the city, which, in a momentary fit of false economy, decided to "do without a reservoir," and to attribute infallibility to a complex imperfect machine. Do what we may to fortify ourselves mechanically, we cannot be sure that an engine driver, or his inexperienced assistants, called from their beds to fight a furious conflagration, may not do, in their excitement, the very thing they ought not to do—close the valve they ought to open, increase the pressure they ought to decrease. It is not safe to trust a city's safety implicitly to the intelligence, capacity, and correct conduct of its employees.

The explosion of a boiler might be looked upon as a remote catastrophe, but it is in fact a present danger, especially under systems involving haste and excitement. The wild enthusiasm usually found at the fire engine is by this "direct system" transferred to the engine-room of the water-works. The further away the fire, the more difficult to get an effective pressure; the more "crowding," the more danger.

It is one of the favorite arguments by which cities are urged to adopt the "direct system," that it does away with steam fire engines, and the accompanying force of trained, ambitious firemen. Much is said about the saving of first cost thus achieved; but we hear little about the saving of property and life. In truth, this argument is one of the strongest against the system. Reservoirs of supply and powerful engines for application, directed by skilful and brave men, are protections against conflagration which no city can spare; and a system which proposes to get rid of them is for that reason, if for no other, bad.

Proposed Tax on Anthracite Coal to Support Hospitals for Disabled Miners.

A proposition is now before the Legislature of Pennsylvania to impose a tax of one cent per ton on all anthracite coal mined after the passage of the act, the proceeds to be devoted "to the erection of three hospitals for the use, free of charge, of persons maimed and crippled in mining and transporting said coal to market; said money to be paid over to seven trustees in each hospital district, four of whom are to be appointed by the Governor of the State, and three by the Judges of the Courts of the several districts, &c."

That some provision should be made for those disabled in the performance of any necessarily dangerous duty is admitted by all those who have given this subject thought, and that the product of their labor should provide an insurance fund, as it were, for the loss, whether of life or property, unavoidably incurred in the production of coal, is just and proper.

The proposed act is not, however, prepared with that thought and care which the importance of the subject demands. If we are to tax coal for the purpose of affording relief to the injured, are we to consider fatal accidents as of less importance, and make no provision for the case where, not a limb only, but life itself, is lost? Laborers in the mines demand and receive higher wages than other classes of labor, for the very reason that their occupation is considered more hazardous, and though no possible increase in wages could be considered an equivalent for the risk to the man who becomes disabled, yet those who participate in the advantages and are not injured, should contribute towards a fund for the benefit of their less fortunate comrades.

A few months ago, we noticed the report of the "Benefit Fund of the Wilkesbarre Coal and Iron Company," and called attention to the desirability of instituting similar funds for the benefit of those injured in the mines at other points. In this case, it will be recollected, the men contribute one day's labor each year, and the company adds the entire product of the mines for one day. The money is applied to the relief of the widows and orphans of those killed in or about the mines, as well as to those injured. In the European mines, and particularly in France, there is almost always a benefit fund belonging to each mine, and all the employees of the mine contribute a certain percentage of their earnings towards it.

We heartily approve of the establishment of such a fund or funds for the benefit of those injured in and about the mines, but we believe

1st. That the miners, as well as the "operators," should contribute to it. And

2d. That the fund will be better administered by placing its management in the hands of those who contribute it, and for whose benefit it is, than by making a State matter of it, and opening a new field for the exploitation of politicians; for if the experience of all the past should not be contradicted the fund would be much more for the benefit of crippled politicians than for disabled miners, and it would necessitate, in a few years, the appointment of an investigating committee to bring to light those rascalities which appear to be inseparable from our Government administration of funds, from the highest to the lowest. Let us have the fund by all means, but not the politicians. *Timeo Danaos et dona ferentes.*

An Opinion as is an Opinion.

WE have received a copy of a remarkable letter and accompanying analyses, transmitted to the Hall Valley Company, of Colorado and London, by the well-known house of Messrs. JOHNSON, MATTHEY & Co., "Assayers and Melters to the Bank of England, Her Majesty's Mint, etc." The certificate of analysis we condense as follows, leaving out one analysis of iron ore:

	I.	II.	III.	IV.
Lead	75.85	19.50	17.00	17.60
Copper	.05	9.40	9 20	2.95
Zinc	....	traces	1.00	.60
Iron	.75	9.15	7.15	5.25
Sulphur	12.75	16.45	12 50	8.50
Arsenic	....	....	.40	traces
Antimony	....	....	.10	
Sulphate of lime	....	25.00	29.50	34.40
Alumina	2.15	11.50	12.00	16.00
Lime	4 90	....	....	
Silica	3.50	8.55	10 50	14.50
Silver	....	0 37	0.65	0.30
Loss	.05	.08	....	....
	100 00	100.00	100.00	100.00

Of the samples here analyzed, the first was galena from the Coldspring and Cumberland lodes, carrying 15.5 oz. of silver per ton of 20 cwt. (2240 lb. avoirdupois); the second was argentiferous galena from the Leftwick lode, carrying 121 oz. of silver per ton; the third was first class Whale ore, (gray copper), carrying 213 oz. of silver per ton; and the fourth was inferior Whale ore, carrying 98 oz. of silver per ton. Messrs. JOHNSON, MATTHEY & Co. say in their letter: "From the general characteristics of the argentiferous ores, we consider them to be, as regards smelting, of a decidedly refractory nature; and we therefore suggest that you obtain the opinion of a practical lead-smelter on the point, which we feel convinced would be by far the most satisfactory course."

In looking over the analyses, to discover where the "decidedly refractory nature" of the ores is indicated, we find a notably small proportion of zinc, arsenic and antimony, the substances which are usually considered troublesome. There is, in fact, nothing portentous in the case, except the large percentage of sulphate of lime which appears in the Whale and Leftwick ores. So large an amount ought surely to be visible to the eye; but an inspection of large amounts of these ores, in the mine and on the dump, shows that they contain apparently *no sulphate of lime at all*, but a good deal of *heavy spar*, or sulphate of baryta. Of this, Messrs. JOHNSON, MATTHEY & Co. do not even find a trace! Their blunder in this case is two-fold. In the first place, sulphate of baryta does not constitute a refractory ore, though it may, by virtue of its amount, render an ore relatively poor in silver and lead. On the other hand, its specific gravity is too high to permit an easy mechanical separation. But sulphate of lime, though more troublesome in smelting, is more easily removed by dressing; and hence the "practical lead-smelter" recommended by these gentlemen to their clients, would be induced by their representations to propose at once a treatment of the ores which would certainly fail.

We wonder how much it costs to obtain one of these profound opinions. If the fees are handsome, the business must be profitable. One has only to shake the head wisely, advise one's client to go to somebody who knows (as he would have to do in any event), give him a little random misinformation for form's sake, and pocket one's £. s. d. with a good conscience. If any questions are subsequently raised as to the "refractory" character of a residuum, one may triumphantly say, "Refractory? of course it was refractory. It was so refractory that we couldn't even make out what it was!" and sign one's name as Assayer and Melter to the Queen or the Mint or whatever. It would take a good deal of heavy sparring to break down *that* defense.

The Aluminous Iron Ores of New York.

IT has long been known that in the neighborhood of Croton and Crugers stations and Sing Sing, New York, there exist deposits of a dense, hard, black, or nearly black mineral closely resembling magnetite, but differing from that ore in containing 25 to 30 per cent. of alumina. Many attempts have been made to work it, but with no continued success, and the fact that it contains for the most part about 5 silica, 30 alumina, 30–40 iron, is enough to show that it is not very desirable for use by itself in the blast furnace, however valuable it may be as a source of basic flux.

Dr. J. P. KIMBALL publishes in the *American Chemist* for March an article on these ores and their possible uses. He says: "Analyses, as follows, were made of typical specimens of this material as distinguished by the eye into three grades:

	I.	II.	III.	IV.
Magnetic oxide of iron	45·86			
Bisulphide of iron	2·63			
Oxide of manganese	0·55			
Alumina	39·36	41·28	45·29	20·95
Lime	0·47			
Magnesia	7·18			
Phosphoric acid	0·22			
Silicic acid	0·51	0·32	6·82	13·97
Titanic acid	2·41	3·90	1·90	4·15
Water	1·18			
Metallic iron	34·44	35.82	29·16	40·32
Sulphur	1·40			
Phosphorus	0·09			

I., II. Granular, massive, resinous; III. Banded variety, gray in general color, and sparkling—from the presence of a micaceous mineral; IV. Quartzose variety, gray and sparkling, like No. III., but without a banded or gneissic structure. The above analyses, together with the physical and mineralogical features of this material, serve to identify its character as a mixture of corundum with magnetite, slightly titaniferous, as usual, when thus associated, analogous to the

emery of Chester, Mass., and in its proportions bearing a still closer resemblance to specimens obtained by Dr. GENTH from the Goldsboro' ore belt of North Carolina in 1871, and analized by this chemist. Like the emery deposits of both of these localities, it is probable that a further development of the Westchester belt will prove it to be in association with magnetic iron ore."

At the late meeting of the American Institute Mining Engineers of the question of the best lining for cupolas used in Bessemer works received some attention and the value of these ores in all situations where the lining would not be subject to the action of an acid slag, was pointed out. Beauxite, which is a hydrous mineral of composition similar to the above, has proved a success in England, and the anhydrous mineral which this country can supply in any desired quantity would undoubtedly prove, from its great density, even more refractory than the calcined hydrous mineral. After pointing out the value of these ores for lining Siemens-Martin steel furnaces, puddling furnaces and Bessemer converters, Dr. KIMBALL announces that he has filed a *caveat* in the Patent Office preliminary to patenting the use of corundum or emery in any plastic admixture, or by itself, as a refractory material. We don't quite see the propriety of granting a patent for the use of a product provided ready made by nature, especially since the use of these aluminous ores is by the Doctor's own confession no novelty. However, that is a point for the Patent Office to settle. The value of these ores as a basic element in a blast furnace charge, or as a basic lining in cases where such a lining is desired, seems to be evident, and they are worth attention, whether patented or not.

NEW PUBLICATIONS.

MESSRS. STECHERT and WOLFF, No. 2 Bond street, New York, deserve the thanks of everybody for introducing into this country PETERMANN'S new map of the United States, which is the most beautiful, accurate and convenient for general purposes with which we are acquainted. We do not know whether to admire most its fullness or its clearness of details. Each of these features would be remarkable by itself; and their successful combination is marvellous. The topography is indicated in its main outlines; the names of places are printed in such a way, and accompanied with such symbols as to indicate their importance, and even, roughly, their population; military, missionary and railroad stations, railroads, wagon-roads, Indian villages, mines, lighthouses, etc., etc., are distinctly shown. The scale of the map is 1 : 3,700,000, or about 58 miles to the inch; and the whole country, (except Alaska,) is included in a sheet only 30 by 50 inches in size, by the sensible device of cutting off the map below at a line starting on the 27th parallel of latitude at either side, and nearly tangent in the center to the 29th parallel. This leaves out a small piece of Florida and a small piece of Texas, which are given in special maps on the same scale, occupying the ocean space East of the Florida coast. The result is, that we are delivered from the nuisance of an immense wall-map, a large part of which represents merely water, and have instead a small and convenient one, packed with information. The price is $3 50 in sheets or $4 50 on rollers; and the map is worth thrice the money.

THE *American Manufacturer* announces that the *Iron World* has been consolidated with that paper by purchase. The *Manufacturer* has not only exhibited great enterprise in laying before its readers the latest news of industrial events in all branches of technical mechanics, but has also discussed with great intelligence and enlarged views the leading questions which affect the interests of manufacturers. We are glad to see evidences of a strong position, and know it to be a paper worthy of support.

Nova Scotia Coal Region.

BY JAMES MACFARLANE.

THE coal trade of Nova Scotia in 1873 amounted to 1,051,467 tons, having doubled since 1869. All the coal of the district is subject to a royalty to the government of ten cents per ton of 2240 lb., and by this means much more accurate statistics of the production can be obtained than from any other region. Geographically the name Nova Scotia only applies to the peninsula, but the Island of Cape Breton, separated from the main land by the strait of Canso, is now the more important coal region. As it was long ago annexed to the province of Nova Scotia as one of its counties, the latter name properly applies to both districts as one political division or province.

In 1825, George IV. granted all the mines and minerals of Nova Scotia to his brother, the Duke of York, who transferred them to the General Mining Association who held the monopoly until December 31, 1857. By an arrangement made at that time with the Provincial Government, this association surrendered their claim to all the mines and minerals except coal within certain defined limits, containing forty-two square miles in five separate tracts, and on which they pay the same royalty. Two of these tracts are in Nova Scotia proper. Leases on the most liberal terms are now granted by the government to all persons desirous of exploring for coal, and to enter into the business of mining. Some twenty-five mines are now worked, but the largest portion of the coal is produced from the Acadia, Albion, Intercolonial, and the Nova Scotia mines in Pictou County in Nova Scotia proper, and at the Sidney, Reserve, Lingan, International, Gowrie, Caledonia, and Block-House mines on the Island of Cape Breton.

Mr. RICHARD BROWN has been the General Manager of the General Mining Association since the year 1826, and has published a small work giving a very interesting and excellent account of the coal fields of Cape Breton and the various mines that have been opened, with a full history of the coal trade of the island.* It is an eminently practical work, containing the very kind of information which business men, interested in that part of the Nova Scotia region, would wish to have. In giving the area of the coal fields of Nova Scotia and Cape Breton, they may be said in general terms to contain 18,000 square miles, but this is the whole extent of the carboniferous formation. The productive coal area, as in other countries, is very much less. Mr. BROWN describes in detail each of the tracts of land on which coal has been discovered and mines opened in Cape Breton, with the number of areas, and even the number of tons of unmined coal in each, with remorseless accuracy. Those interested in any of these coal mines are referred to the following tabular statement made up from Mr. BROWN'S book. In making this estimate he assumes that each acre of coal, one foot in thickness, contains 1500 tons, taking the average specific gravity at 1.250, which is certainly a very liberal basis, as 1000 tons to the foot is the more usual rate for estimating coal in the ground.

ACCOUNT OF THE COLLIERIES IN CAPE BRETON, SHOWING THE QUANTITY OF COAL IN THE GROUND.

		Tons.
1.	South Head ..... 50 Acres.	262.500
2.	Tracey	3,520,000
3.	Gowrie, Cow Bay	11,872,000
4.	Block House	9,750,000
5.	Acadia ..... Trifling quantity	
6.	Clyde	12,500,000
7.	Caledonia	25,605.000
8.	Glace Bay	43,900,000
9.	International	47 600,000
10.	Victoria	55,640,000
11.	Inghabom ..... 20Acres.	.....
12.	Collins	750,000
13.	Mathewson	.....
14.	Black Rock	2.700,000
15.	New Campbelton	9,000,00
16.	Chimney Corner ..... Small	
17.	Broad Cove ..... Small	
18.	Mabon Area	27,000,000
19.	Port Hood	.....
20.	Richmond	.....
21.	Sea Coal Bay	.....
22.	Glasgow	9,633,000
	Total new mines	259.732.500
	Coal in the lands of the General Mining Asso'n ..	601,587,875
	Total coal in Cape Breton	861,320,375

This does not include Nova Scotia proper.

The acreage of the coal areas of the General Mining Association amounts to 31,000, of which 9,600 acres are under the sea. But of the 601,587,875 tons of coal, 60 per cent., or 362,255,000 tons is contained in these submarine areas, and only 239,332,875 tons is on the main land.

Those familiar with the coal mining business will find in the foregoing statements data from which to make the proper allowance in calculating the probable actual future production of this coal field.

The Sidney Mines have a great advantage in being situated near the mouth of the harbor. Many of the other localities are in exposed situations, where shipments can only be made in fine weather, with an off-shore wind.

The coal-field of Sidney, the most extensive, and it may be safely asserted, the most valuable in the Province of Nova Scotia, Mr. BROWN says, is a tract of country extending a distance of 31 miles along the north coast of the Island of Cape Breton, containing an area of about 200 square miles, indented by several bays and harbors. The coast consists of cliffs from 20 to 100 feet high, exposing sections of the coal measures, from which the land rises gradually towards the interior, rarely attaining a greater elevation than 150 feet at a distance of one mile from the shore. These cliffs, exposed to the abrading action of the surf, are gradually but steadily wearing away; sometimes large masses, being undermined, slit off and become detached. In former times large quantities of coal were stolen by vessels, being picked up on the beach after being mined out by this natural process. Mr. BROWN says, if not arrested by artificial means, in the course of time the whole of the coal lands will become the prey of the ocean. But if the new impulse given to the coal trade within the last two years should continue, it seems more likely that the coal of Cape Breton will all be taken care of and applied to the supply of human wants before it is destroyed by the slower process of nature.

The several small coal basins, of which Mr. BROWN gives us the quantities, are situated, as shown on his map, like a number of prows of vessels sticking in the cliffs along the coast, the remainder of the hulls having been washed away. It is said that the other extremities of these synclynal basins are to be found on the coast of Newfoundland. It is evident that the good and valuable coal properties are few in number and many of them quite small in extent, sometimes only the very point of the basin alone being left, containing a few acres. This, however, only increases the value of the larger coal areas. Too much coal is good for the country, but it is often ruinous to the profits of the producer. Judging from the prices paid for Nova Scotia coal in 1873, there must have been a very handsome profit on the business. In advance of the publication of the Report of the Department of Mines for 1873, I have procured the following account of the coal trade, showing that a new era has dawned on this region since the rise in the

* The Coal Fields and Coal Trade of the Island of Cape Breton. By RICHARD BROWN. London, SAMPSON, LOW, MARSTON, LOW & SEARLE, 1871. 8 vo. p.p. 165, with maps and illustrations.

prices of coal in Great Britain and the lowering of the duty on coal in the United States.

COAL TRADE OF NOVA SCOTIA.

	1872.	1873.
Cumberland County	15,750	27,592
Pictou	422,716	383,949
Cape Breton	437,326	639,085
Other Counties	5,158	841
Total	880,950	1,051,467

For several previous years the trade was :

1864	576,934	1868	453,624
1865	635,586	1869	511,794
1866	558,519	1870	625,769
1867	471,185	1871	673,242

For further particulars in regard to the Nova Scotia and Cape Breton coa fields, the reader is referred to the work lately published by D. APPLETON & Co., called "The Coal Regions of America."*

On old geological maps Prince Edward's Island is represented as under-laid with coal. But it is covered with new red sandstone, and is thought by Dr. DAWSON, who lately explored it, to contain no coal within a depth possible for mining.

There are thin seams of coal in Newfoundland similar to those in New Brunswick.

Mining Engineering.

Prepared for "Johnson's Universal Cyclopedia," by PROF. F. L. VINTON, E. M.

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ATTACK OF THICK VEINS.

A VEIN or inclined mass of any dip, too thick to be conveniently propped up or braced across, cannot be attacked in the preceding form, yet sometimes this difficult condition does not forbid a thorough exploitation. Under this head two cases present themselves ; in the first, the vein body is supposed to be sound and consistent; in the second, unsolid and friable. Assuming the first situation, and admitting also that filling can be procured in the vein, the mass will be best attacked by works which may be called traverse headings. A vertical shaft is first sunk outside of the vein and in the country rock which is contiguous to the foot-wall ; from this shaft, at convenient levels, adits are drifted across to the vein, and from where they reach it, galleries are driven to the left and right, in the vein mass, and along its footwall ; but these are not necessarily connected with each other. Any one of these galleries has now exposed, we may say, the side of a horizontal slice of the vein, two meters high, and as long as the gallery. If then, upon this exposure, miners be placed at intervals of six meters, who drift traverses two meters high and two meters wide through the vein mass, from wall to wall, there will remain at any time between each heading a column of vein mass four meters thick for support. After all the ore is extracted from these traverses they are carefully filled, after which, the remaining masses are mined out in the same manner by alternate headings of two meters wide, and filled while the filling in the exploited traverses acts as support. If the vein mass prove not staunchly solid the fronts of attack may be less opened, the traverses for instance being but one meter wide, or, if two meters, they may be pushed forward in two horrizontal slopes, a meter wide each, and the one preceding the other by a sufficient distance to break the front. Thus can be completely mined out and filled a horizontal slice or section of the vein, two meters high, and as long as convenient. In the mean time the first gangway has been kept always open and in repair, since it is to serve for all the exploitation from below upwards, between two levels. Next in order, then, is to drift immediately over this gangway, in the vein mass, another gallery which uncovers the front of another section of vein directly over the filling of the one already exploited This and any number of succeeding ones is mined in the same manner, the mineral to be extracted is shuted into the original gangway and transported to the shaft. In order to excavate the entirety of the vein by this method, it might seem proper to exploit but one level at a time, beginning at the very lowest and working upwards, from level to level, upon a filling always underneath, thereby leaving no sills of ore between the levels; but as it is usually desirable to operate in more than one level at a time, it is convenient to base the filling of each level on a grating of logs, joined with clay and packing earths, which will support itself and the filling above so that the mining and filling below can be brought up to its utmost limit, satisfying the condition of an absolutely entire exploitation. In this same case, if it happen that filling be altogether lacking or inadequate, and too expensive to introduce from outside, the mineral itself being of little value, as in some iron ores, then the levels must be attacked in stories of galleries and pillars instead of in slices of traverses and filling.

This method develops naturally at the lowest point of exploitation, and proceeds from below upwards. Between each story there must be left a sill of ore for the support of the system ; but the number of these is diminished by making the galleries high, and distributing the pillars in each story directly over those below. This method is so imperfect as to involve the relinquishing of one-half the vein, but it is the only one for thick masses of cheap ores yielding no filling. The heading of these high galleries is drifted in steps, after the manner of underhand stoping.

ATTACK OF A THICK VEIN, NOT SOLID, BUT FRIABLE.

In all the preceding cases the main condition and proof of an able exploitation was to obtain mineral economically, and with the least surrender of ore to the exigencies of support. In this case, however, the safety of the works is the prime characteristic of a scientific attack ; because, in fact, that element of the problem being by far the most difficult, becomes the most prominent. The method by galleries and pillars is eliminated here, and there remain only two processes available ; one of which is even less satisfactory than that of pillars and galleries. It may be denominated attack by caving. In the first place, the shafts and levels through which the vein is to be attained, are placed entirely in the solid rock of the foot-wall, far enough from the unstable mass to secure them from all movement. From these levels, which are gangways parallel to the strike of the vein, little galleries, like traverse headings, are driven into and through the mass, from foot-wall to hanging-wall. These adits may be spaced three meters apart, and are strongly timbered. When the miners have pushed all these as far as the hanging-wall, the preparation for caving is completed and the whole corps begin to beat a retreat, removing the timbering and supports cautiously by degrees. This gradual unpinning mines the mass superincumbent on the gallery, and the vein matter creeps down in a talus into the cavity, following the miners as they withdraw the mineral and the timbering. The subsidence of the earth propagates itself upward four or five meters, and the natural direction of this course of exploitation is from above downwards ; therefore, when the galleries of one level have been evacuated, another system is opened six meters below, and the same operation is renewed. Methods by caving are cheap, but they exact an active surveillance and imply the disadvantages of a certain loss of material, a disturbance of the surface, and the incursion of surface waters.

Less inconvenient than this method, but more expensive is a second, somewhat akin to traverses with filling. The works of approach are entirely located and maintained in the outside rock, and always in the foot-wall, where there is less probability of movement than on the roof and the traverse system is a net of low galleries which are immediately stopped, after exploitation, by filling, which, if necessary, must be introduced from the surface. The process of this exploitation, as in traverse headings, is normally from below upward, though with extreme caution more than one level may be exploited at a time, as in that illustration.

TO BE CONTINUED.

* The Coal Regions of America : their Topography, Geology, and Development, with a colored geographical map of Pennsylvania, and numerous other maps and illustrations. By JAMES MACFARLANE. 8vo. p.p. 694. $5.

TRADE REVIEW.

NEW YORK, March 27, 1874.

The dullness in this coal market for anthracite is increasing, rather than diminishing. Many of our dealers state that they have never known business so sluggish at this season, and it is a universal remark that collections are even more difficult now than they were during "the panic." Our statements of receipts and shipments at the shipping ports show very clearly that business in this branch is still paralyzed, and it is scarcely probable that it will revive to what would be termed fair or moderately brisk for some months yet.

The total quantity of anthracite mined for the week ending 21st inst. was 326,916 tons, as against 310,825 tons the previous week.

The receipts at Port Richmond for the past week were 46,000 tons; shipments, 34,000 tons; stock on hand, 85,000 tons.

At South Amboy the receipts for shipment were 10,906 tons; actually shipped, 12,245 tons.

At Coal Port, receipts, 3,654 tons; shipments, 1,964 tons.

The settlement of the currency question by Congress, whether the amount be limited to 360, 382, or 400 millions, will matter less than the fact of its being *fixed*, will certainly exercise a potent influence on the resumption of manufacturing business, and with it on the consumption of coal. The uncertainty as to the future, and a lingering doubt of the strength of the coal combination, makes many unwilling to contract for their season's supply, the season prices for Wilkes-Barre coal—lump $4 70, steamer $4 90, grate $4 80, egg $5 05, chestnut $5 15—being above the present price; consequently the lack of demand for immediate use is felt heavily, our dealers, excepting the large companies, neither selling much at present, nor booking orders for future delivery.

A full supply of bituminous coal having been generally laid in before the panic in September last, and the consumption having ceased for several months, even at the mills which are now working, left a large stock on hand. This is being gradually worked off; and the principal dealers report greater demand this week than there has been previously. This coal goes principally to the Eastern manufactories, and this improvement indicates an increasing activity in manufacturing interests.

Since our last issue, we note some large transactions in gas coals for this market. The sales cover nearly 300,000 tons of Westmoreland and Pennsylvania coals, at $7 50 per ton, delivered in New York ; 30,000 tons Block House and Caledonia coal, at from $2 00@$2 12½ gold, per ton at mines, and 22,000 Cannelton cannel, on private terms.

The above transactions show an increase of sales of the Westmoreland and Pennsylvania coals over 1873, of nearly 140,000 tons, at a reduction of 75 cents on price.

The quantity of Provincial coal contracted for is only one-fourth of that sold last year, the present supply of this description of coal being nearly sufficient for one year. The prices of this coal are not materially reduced. The sales of Cannelton are largely in excess of 1873, the value of this coal as an enricher having become generally recognized, and the facilities of the Company considerably enlarged to meet any demand likely to come.

The Scranton sale of the 25th showed a general maintenance of the programme prices, averaging five cents above the price of the February sale. The following are the amounts of the different sizes sold and the average prices obtained:

7,000 tons steamer—$4 50; decline 2½ cents.
15,000 tons broken—$4 99½; advance 6½ cents.
6,000 tons egg—$4 82½; advance 8½ cents.
25,000 tons stove—$5 25; advance 7½ cents.
7,000 tons chestnut—$4 24; advance 4½ cents.

60 000

Average, $4 84; increase, 5 cents per ton.

From Philadelphia our correspondent writes :

The coal trade continues dull, and is in full sympathy, in that respect, with all business. The wharves at Port Richmond, and particularly those used by the Philadelphia and Reading Coal and Iron Company, are filling up very fast. Vessels continue to be in abundant supply, and rates of freight low for the season. We quote $2 50 to Boston, $2 00 to Providence, and as low as $1 00 to $1 05 to Washington. The curtailment of 15 per cent, agreed upon for the month of April

by the combined companies, must take place here before that month is reached, or a blockade of loaded cars must inevitably follow.

The circular of the Philadelphia and Reading Coal and Iron Company for prices on board in April conforms to the programme laid out for the year, and shows an advance of five cents over the prices for March. Prices at Port Carbon for April, for line and city trade, remain the same as for March, viz.: $2 75 for lump, steamboat and broken; $2 90 for egg; $3 00 for stove; $2 25 for chestnut, and $1 25 for pea. The line trade can hardly be called fair. This is generally one of the best months for domestic sizes, but the mild Winter has left ample stocks in the cellars.

All the coal dust made at Port Richmond has been sold for the next five years to Mr. E. F. Loiseau, who intends to erect works in the vicinity to manufacture with it his patent fuel, in size corresponding to domestic stove coal.

In Pittsburgh the coal market is very dull; the continued stagnation of the iron trade, which shows little indication of revival, has depressed the coal trade of Pittsburg more than most of our coal markets. Prices are very low, as will be seen by reference to our price lists.

In Youngstown, O., the block coal is exceedingly dull and the price tending downwards.

Many of the mines have stopped work, and others are working only part time.

We quote bituminous coal $3 80 per ton; anthracite $9 per ton.

THE BRITISH COAL TRADE.

LONDON, March 7, 1874.

The general condition of this branch of business continues very dull. In some districts we note a slight improvement, while in others, the contrary; so that on the whole there has been no marked change. We have rumors of reductions of wages from nearly all the districts, but learn of no strikes. In some cases the miners are endeavoring to avoid a reduction in wages by lessening the output, by working but three days a week. This may do in a few localities, but in the majority of cases it will permit other districts, where the men have submitted to a reduction, to compete with them at their very doors. Reports from Birmingham mention a reduction in miners' wages of 1s. per day for thick coal, and 9d. for thin coal. In the Channock Chase and South Staffordshire districts, it has been decided to make the same reduction. At Bath, the masters who are prepared with coal-cutting machinery, are determined that a reduction shall take place, and are resolute in their intentions to reduce wages 10 per cent. Stocks are generally increasing, and reports from Chesterfield say that at many sidings and stations there are long trains of loaded cars awaiting purchasers. In the Midlands the supply is greatly in excess of the requirements. The Channock coal owners have resolved to reduce the price of best coals 5s., forge coal 4s., and slack 3s. 6d., to commence on the 9th inst. Coal will undoubtedly be lower in Liverpool, as it is finding its way there from the distance, and will soon overstock that market. The following are some of the leading quotations: Middlesbrough-on-Tees, households, at 16s.@17s., and manufacturing, 11s.@12s., at pits; best coke 29s.@35s.; at Hartpool, Sunderland and the Tyne, best households at 16s@17s.; good screened manufacturing coals, 14s. 6d @14s.; unscreened, 10s. @11s. 6.; and inferior, 9s. at the pit.; at Barnsley, steam at 17s.; and softs at 12s.; at Dudley, best coal 23s.; common, 18s. 6d., lump, 17s. 6d.; and fine slack, 9s.; at Manchester, best house, 23s. 4d.; seconds, 22s. 6d.; thirds, 21s. 8d.; nuts, 16s. 8d.; burgie, 15s. 10d., and slack 12s. 11d., delivered.; at Cleveland, manufacturing coals, 12s.@14s.; house coals, 16s.@17s., and coke at 29s.

Wales.—Advices from Cardiff state that there is considerable activity to be noticed at that port and vicinity. The business in steam coals continues brisk, with every prospect of a similar state of things existing for some time. The exports for the last week have shown a slight increase on the former weeks, and there is still a brisk demand for the leading foreign markets. Prices of house coals have been quite firm since the first of the year, notwithstanding the reports of reductions being made in other districts; but during the last day or two orders have been taken 3s. per ton below old quotations. The men are working quite steadily, apparently preparing themselves to meet an anticipated reduction in wages. Cargoes of best steam coal, double screened, for shipment at short periods, can be bought at 19s.@20s.

Scotland.—Coals are unchanged in value, and are likely to remain so until the present dispute in regard to the wages question shall have been settled. Notices of reductions, varying from 6d. to 2s. per day, have now been given all over the mining districts, east and west. There are a few cases where the miners have already accepted the reduction, such as Airdrie, where it has been agreed to continue working at the reduced rate of wages, while the working days and hours are to be still further restricted. The union leaders have now come to the conclusion that a reduction is inevitable, and they will now try to make it less than proposed by the employers.

Ireland.—The general tendency of prices is downward. The home production is not very remunerative, especially under home management. In a few cases under English management the business has been a success. There are no important developments being made, and the production is on the decrease.

COAL PRODUCTION.

Anthracite.

Mined for the week ending March 21, 1874.

	WEEK. tons.	YEAR.* tons.
Wyoming Region.		
Delaware and Hudson Canal Co	45,714	441,511
Delaware, Lackawanna and Western RR.	40,927	459,997
Pennsylvania Coal Co	19,667	230,235
Lehigh Valley R.R	18,091	197,723
Pennsylvania and New York Railroad	848	10,033
Central Railroad of New Jersey	21,407	187,625
Lehigh Region.		
Lehigh Valley Railroad	54,552‡	550,682
Central Railroad of New Jersey	8,508	102,926
Schuylkill Region.		
Philadelphia and Reading Railroad	107,262	603,991
Shamokin and Lykens Valley	9,645	91,132
Sullivan Region.		
Sullivan and Erie Railroad	295	4,825
Total	326,916	2,880,680

* Year beginning January 1st.

Bituminous.

Mined for the Week Ending March 21.

	Week. Tons.	Year Tons.
Cumberland and Pennsylvania R.R	25,581	232,604
Cumberland Branch R.R	2 578	24,162
Philadelphia and Reading R.R	5,949	62,092
Barclay R.R	71	35,181
Huntingdon & Broad Top R.R	7.905	84,760
Tyrone Division Penn. R.R	....	123.705

Port Richmond.

	March 21. Tons.
Receipts for week	46,000
Shipments for week	34,000
Balance on hand	85,000

St. Louis Coal Receip's.

The receipts of coal from March 1st to the 15th are given below:

Railroads.	Cars.	bush.
Belleville and Southern Illinois	1036	300,440
Ill. and St. Louis R.R. & Coal Co	488	141,520
Ohio and Mississippi	666	293,140
St. Louis and Southeasterrn	420	121,800
St. Louis, Vandalia, T. H. & Ind	540	156,600
Total	3150	913,500

The receipts for the month of February by the Cairo and St. Louis (narrow gauge) were 607 car loads, making 4305 tons of Big Muddy coal.

STATEMENT of coal and coke transported over the Pennsylvania Railroads during the months of January and February, 1874, in tons of 2240 lb.

	January.			February.			Total.		
	Coal.	Coke.		Coal.	Coke.		Coal.	Coke.	
Anthracite	42,931	....		32,101	25		75,032	25	
Huntingdon and Broad Top	13,616	....		11,839	....		25,455	....	
Cumberland*	9,482	....		12,103	....		21,585	....	
Snow Shoe	3,571	....		4,370	36		7,941	36	
Tyrone and Clearfield	45,793	....		35,265	20		81,058	20	
Allegheny Region	17,769	....		15,425	....		33,214	....	
West Penn	14,446	....		15,875	3,147		30,321	6,278	
South West Penn	75	23,502		452	19,130		527	42,632	
Gas Coal	58,138	2,455		48,663	3,234		106,801	5,689	
Pittsburgh†	24,624	10,265		25,539	6,985		50,163	17,250	
Black Creek Region, D. L. & W. R.R. anth.	3,118	....		1,013	....		4,131	....	
Total	233,583	39,353		202,645	32,577		436,228	71,930	

* Going over Huntingdon and Broad Top R.R.

† Embraces district from Brinton's to Pittsburgh inclusive.

The following is a report of the production of coal and iron on the line of the South and North Alabama Railroad for the month of February, 1874:

	Cars.	Tons. Estimated.
Cahaba coal field	74	740
Warrior "	147	1,470
Total	221	2,210

The Red Mountain Iron Co. shipped 130 tons iron.

MARKET PRICES OF COAL.

Import Duty on Coal.

Anthracite free. Bituminous, per ton of 28 bushels, 80 lb. to the bushel, 75c., gold.

All slack, or culm, such as will pass through a half-inch screen, per ton of 28 bushels, 80 lb. per bushel, 45c., gold.

Not otherwise provided for, per ton, 40c., gold.

ANTHRACITE.

WHOLESALE PRICES.† F. O. B. AT SHIPPING PORTS.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Scranton at Elizabethport	4 60	4 70	4 80	4 95	5 40	4 40
*Lackawanna	4 60	4 70	4 80	4 95	5 40	4 40
§Pittston at Newburgh	4 30	4 30	4 40	4 50	5 00	4 15
Wilkesbarre at Port Johnston	4 60	4 70	4 80	4 95	5 40	4 40
Newport and Plymouth	....	....	4 80	4 95	5 60	4 40
Susquehanna Coal Co. at Amboy	4 75	4 85	4 90	5 05	5 50	4 50
Red Ash, Harvey coal	....	....	4 90	5 05	5 60	4 50
Lehigh Coals.						
Old Company at Port Johnston	5 55	....	5 50	5 50	5 40	4 40
Old Company's Room Run	5 05	....	5 05	5 05	5 65	4 70
Sugar Loaf at Port Johnston	5 55	....	5 50	5 50	5 50	4 55
Hazleton at Elizabethport	5 40	....	5 35	5 35	5 50	4 55
Honey Brook at Elizabethport	5 40	....	5 35	5 35	5 50	4 55
Spring Mt. C. Co. at Hoboken	5 40	5 40	5 35	5 35	5 65	4 70
Beaver Meadow at South Amboy	5 55	....	5 50	5 50	5 50	4 55
McNeal at Port Johnston	5 40	5 40	5 35	5 35		
Schuylkill Coals at Port Richmond.					4 90	3 55
Schuylkill White Ash	4 10	4 20	4 30	4 45	4 90	3 80
Schuylkill Red Ash	....	....	4 45	4 60	4 90	4 05
Shamokin W. and R. Ash	....	....	4 55	4 90	4 90	3 80
N. Franklin	....	....	4 90	4 90	5 05	4 05
Lorberry	....	....	5 05	5 05	5 80	4 55
Lykens Valley	....	....	....	5 80	5 60	4 50

* f. o. b. in New York Harbor.

† Prices for April, as per circulars dated March 20, 1874.

§These are net prices for delivery, during April, of coal previously contracted for, and are not rates at which the company would now make contracts.

‡ These prices are for registered contracts. Buyers not having contracts will be charged 15 cents per ton more than above prices.

Scranton sale, March 25th, averages: Steamer, $4 50; grate, $4 59½; egg, $4 82½; stove, $5 25; chestnut, $4 24.

Line Prices for March, 1874.

At	Lump and Broken.	Egg.	Stove.	Chestnut.	Pea.
Carbondale	2 25	2 25	2 50	2 00	1 25
Fair Haven	6 00	6 25	6 50	6 25	....
Ithaca, New York	4 90	4 90	5 40	5 15	....
Mauch Chunk, Lehigh coal	3 35	3 35	3 60	3 10	....
" Newport coal	2 25	2 25	3 50	3 00	....
" Wilkes-Barre coal	3 09	3 34	3 49	3 09	....
Pittston	2 25	2 25	2 50	2 25	....
*Port Carbon	2 75	2 90	3 00	2 25	1 25
*Port Clinton	2 91	3 09	3 19	2 44	1 44
*Schuylkill Haven	2 83	2 98	3 08	2 33	1 33
Scranton	2 25	2 25	2 50	....	1 25
Wilkes-Barre	2 25	2 25	2 50	2 00	1 25
Waverly	4 75	5 00	5 25	5 00	....

* April prices.

New York Wholesale Prices.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals						
Scranton	5 10	5 20	5 30	5 45	5 90	4 90
Lackawanna, Delivered on wharf	5 10	5 10	5 30	5 45	6 90	4 90
Pittston	4 95	5 00	5 10	5 20	5 70	4 85
Wilkesbarre	5 05	5 15	5 25	5 40	5 85	4 85
Newport & Plymouth	...	...	5 25	5 40	6 05	4 85
Susquehanna Coal Co.	5 25	5 35	5 40	5 55	6 00	5 00
Lehigh Coals.						
Old Company	6 00	....	5 95	5 95	6 10	5 15
Old Co.'s Room Run	5 50	...	5 50	5 50	5 85	4 85
Sugar Loaf	6 00	....	5 95	5 95	6 10	5 15
Hazleton	5 85	....	5 80	5 80	5 95	5 00
Honey Brook	5 85	....	5 80	5 80	5 95	5 00
Spr'g Mount. Coal Co.	5 85	5 85	5 80	5 80	5 95	5 00
Beaver Meadow	6 05	....	6 00	6 00	6 15	5 20
McNeal	5 85	5 85	5 80	5 80	5 95	5 00
Schuylk'l Coals. Alongside.						
Schuylkill W. A	4 95	5 05	5 15	5 30	5 75	4 40
Schuylkill Red Ash	...	....	5 45	5 60	5 90	4 80
Shamokin W. & R. Ash	....	....	5 55	5 90	5 90	5 05
North Franklin	....	....	5 90	5 90	5 90	4 80
Lorberry	....	....	6 05	6 05	6 05	5 05
Lykens Valley	....	....	....	6 75	6 75	5 50

BITUMINOUS.

WHOLESALE PRICES. F. O. B.

Per ton of 2240 lb.

Broad Top	$6 75	Ohio Caking	10 00
Derby	6 75	Ohio Cannel	12 50
Kittaning	6 75	Lyonsdale Coal	12 50
George's Creek, Cumberland	700@7 25	James River Bit	6 50
		" Carb	9 00
West Virginia Gas	7 50	Kanawha Cannel	16 50
Peytona Cannel	13 50	Liverpool Gas Cannel	12 50
Penn. Gas	7 65	" House "	18 00
Westmoreland Gas	7 65	Newcastle Gas	12 50
Sterling Cannel	14 00	Red Bank Cannel	12 00
" " del'v'd.	16 00		

Freight from Richmond, Va., to New York, $2 00.

RETAIL PRICES.

PER TON OF 2000 LB.

Liverpool House Orrel, delivered	$20 00@$22 00
Liverpool House, Cannel, delivered	20 00@ 25 00
American and Block, delivered	16 00@ ——
Straitsville Cannel	16 00@ ——

	Grate and Egg.	Stove.	Chestnut.
Pittston Coal, in yard	$5 60	$5 80	$5 00
Delaware & Hudson, delivered	6 60	6 85	6 10
Scranton, delivered	6 75	7 00	6 25
Wilkesbarre, in yard	6 00	6 25	5 50
Lehigh and Locust Mountain, del'd	7 00	7 50	6 50

Coal Freights from the Anthracite Mines to the Principal Markets.

Schuylkill Coals, per ton of 2240 lb.	From Pine Grove.	From Tamaqua.	From Port Carbon.	From Mount Carbon.	From Schuylkill Haven.	From Port Clinton.
To *Belmont & W. Manayunk, via P. & R. R. R., "main line"	$2 12	$2 07	$2 00	$1 99	$1 92	$
* Port Richmond, "for shipment." " " "	2 12	2 07	2 00	1 99	1 92	—
* Philadelphia and "retail yards," " " "	2 22	2 17	2 10	2 09	2 02	—
† Philadelphia, including the charge for the use of cars, barges, and for toll, via Schuylkill Canal	—	—	—	—	1 75	1 64
* Swede Furnace, " " "	1 88	1 83	1 76	1 75	1 68	—
* Aramingo, " " "	1 62	1 57	1 50	1 49	1 42	—
* Port Clinton, " " "	91	86	79	78	71	—
* Allentown, via East Pennsylvania Branch	1 57	1 52	1 45	1 44	1 37	—
* Col'bia, Lanc'r, & points on Lan. Brch., via R. & C. R. R.	1 77	1 72	1 65	1 64	1 57	—
* Heidelberg, via Lebanon Valley Branch	1 54	1 49	1 42	1 41	1 34	—
* Robesonia, via L. and T. Branch	1 35	1 49	1 42	1 41	1 34	—
* Lebanon " "	96	1 55	1 48	1 47	1 40	—
* Harrisburg and Paxton, via L. and T. Branch	1 38	1 72	1 65	1 64	1 57	—
* Dauphin, via Schuylkill and Susquehanna Branch	70	—	1 40	1 39	1 32	—
* Harrisburg, " " "	85	—	1 50	1 49	1 42	—
* Jonestown, via Lebanon and Tremont Branch	90		1 80	1 79	1 72	—
* Lebanon, " " "	96		2 01	2 00	1 93	—
† Reading, including charges for the use of cars, barges, and for toll, via Schuylkill Canal	—	—	—	—	95	84
† Bridsburg, add $10 per boat, via Schuylkill Canal	—	—	—	—	65	60
† Trenton, N. J., " "	—	—	—	—	1 00	95
† New York, " "	—	—	—	—	1 62	1 57
† Wilmington, Del., " "	—	—	—	—	85	80
† Bridgeton, N. J., " "	—	—	—	—	1 60	1 55

* These tolls do not include wharfage or shipping expenses at tide ports.

† Ten per cent. is deducted from these rates for lump, steamboat and broken coal.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton.	From Upper Lehigh.	From Ashley and Sugar Notch.	Lackawanna Junction.
To ‡ Newark, N. J. via Central Railroad of N. J.	2 43	2 29	—	—	—	—
‡ Mauch Chunk, Pa. " " "	14	—	—	—	—	—
‡ Phillipsburg, N. J.	92	78	—	—	—	—
‡ Elizabethport, Port Johnston, Hoboken and South Amboy, N. J., shipping and wharfage 35c. additional	2 07	1 93	—	3 34	3 64	—
High Bridge, N. J.		2 20	—	2 79	3 09	—
Somerville and Raritan, N. J.	—	2 60	—	3 19	3 49	—
Elizabeth, Cranford, Westfield and Elizabethport, for cosumption	—	2 75	—	3 34	3 64	—
Jersey City, Bergen Point and Communipaw, N. J.	—	2 65	—	3 24	3 54	—
Andover, via Del., Lack., and Western R. R.	—	—	—	—	—	—
Port Oram, Dover and Boonton	—	—	—	—	—	—
§ Trenton, Somerset Junction & Greensburg, via P. R. R., Belvidere division	—	1 97	—	—	—	—
Trenton, for shipment, including shipping and wharfage						
Owego, N. Y.	3 06	2 92	—	—	—	2 18
Groton	4 10	3 96	—	—	—	—
Auburn	3 34	3 20	—	—	—	—
Waverly	2 98	2 84	—	—	—	2 10
Athens	2 94	2 80	—	—	—	2 06

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

Georgetown, D. C., and Alexandria, Va.

George's Creek and Cumberland f. o. b. $5 25, wholesale.

Buffalo, N. Y.

Youghiogheny Gas Coal	$6 00	Connellsville coke	8 00
Catfish Lump	4 75	Beaver Gas Coal	6 50
" Nut	3 50	Red Bank Cannel	5 50
" Nut and Slack	3 00	" Orrel	5 00
" Slack	2 85		

Anthracite, per 2000lb. in cars; retail prices, delivered, $1 50 per ton additional.

Lump	$6 50	Stove	6 50
Grate	6 00	Chestnut	6 25
Egg	6 25		

Baltimore, Md.

Wholesale Prices to Trade.

Corrected weekly by E. Stabler, Jr., coal merchant.

Wilkesbarre, by cargoes or cars	$6 25@
Pittston and Plymouth	6 00@
Shamokin Red or White Ash	6 00@
Lykens Valley Red Ash	6 55@
Retail, per ton 2240 lb. (all kinds)	7 50@ 8 50
George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 85@5 00
West Va. Gas Coal f. o. b. at Locust Point	6 50@
Kanawha Cannel, coarse	13 00@
Tyrone	7 25@
Ritchie Mineral of West Virginia	19 00@

Boston, Mass.

There has been a fair business done in contracts for the season by coal companies. There are some cargoes arriving, but few come upon the market. The retail demand is fair for the season, and prices are unchanged. We quote:

English Cannel	$25 00@26 00	Pictou	8 25
do do from ship	22 00	Sydney	9 00
Scotch Cannel	15 00@18 00	Acadia	6 75@ 7 25
American Cannel	14 00@15 00	Cumberland	7 65@ 8 00
Lingan	8 25	Anthracite, retail	8 75@ 9 00
Caledonia	7 75	" by cargo	7 50@ 8 00

Chicago, Ill.—March 23.

REPORTED BY RENO & LITTLE, COAL MERCHANTS.

No change in prices of coal; demand light. We quote:

Lehigh Lump	$11 00	Midway (West Va.)	8 00@ 8 50
Lehigh prepared	10 50@11 00	Cannel	9 00@10 00
Lackawanna, Wilkes-Barre and Pittston	10 00	Blossburg	9 00
BITUMINOUS.		Indiana Block	6 50
Briar Hill and Erie	8 00@ 8 50	Hocking "Brooks"	8 00
Walnut Hill (W.V.)	8 00@ 8 50	Wilmington and Illinois	5 00

Cincinnati, O.

The demand continues good for the season. The low rates are inducing many consumers to lay in their next winter's supplies. We quote:

	Bush.	Tons.
Youghiogheny, afloat	9 c.	$2 52
Ohio River	8 c.	2 24
Pittsburgh	11 c.	3 08
Anthracite	—	11 00

The following are retail prices delivered:

Ohio River, Pomroy	12 c.	3 36
Kanawha	13 c.	3 64
Kanawha Cannel	24 c.	6 72
Pittsburgh	12 c.	3 36
Youghiogheny	14 c.	3 92

Cleveland, O.

Youghiogheny, f. o. b., per ton	$4 75	Hocking Valley	3 75
Briar Hill	4 00	Morris	3 60
Massilion	3 75	Cleveland Lump	3 00
Massilion nut	3 50	Silver Creek	4 60
Chippewa	3 75	Anthrac te, prepared	10 00
		Anthracite, lump	11 00

Denver, Col.

RETAIL PRICES.

Canon	$6 50	Boulder Valley	$4 75
Marshall	5 50	Eulner	5 50
Murphy	5 50	Black Diamond	5 50
Baker	5 00		

Detroit.

The demand is steady and prices are unchanged.

Lehigh Lump, per ton	$11 00	Brookfield	8 50
Lehigh nut	10 00	Chippewa	8 00
Scranton, various sizes	9 50	Massilon	8 00
Blossburg	9 50	Straitsville	5 50
Willow Bank	8 00	Nut	4 75
Briar Hill	8 50		

Indianapolis, Ind.

Per 2000 lb. WHOLESALE.		Per 2000 lb. WHOLESALE.	
Brazil Block	$3 65	Steam Nut	2 25
Highland	3 60	Hocking Valley	4 20
" steam	3 20	Gas Coke per bush	12 c.
Brazil nut	3 00	Pittsburgh	5 70
Slack	2 50	Sand Creek	5 00
Virginia Cannel	9 00	Anthracite	12 00
Indiana Cannel	7 20		

Louisville, Ky.

	Bush.	Tons.
Pittsburgh, afloat	10 c.	$2 80
" retail	14 c.	3 92
Kentucky	12@14 c.	3 36@3 92
Indiana and Peacock Pomroy	12@14 c.	3 36@3 92
Anthracite, per ton, from yard		10 00@10 50
" afloat		9 00@

New Orleans, La.

Large supply, with but moderate demand. We quote:

Pittsburgh, wholesale, per bbl	40c.
" at retail	75c.
" per hhd	$7 00
" per box to steamboats	50c.
" " to manufacturers	60c.
Virginia cannel, per bbl	$1 25
Anthracite, per ton	$13 00

Omaha, Neb.

Blossburg (blacksmith)	$18 00	Wyoming	12 00
Anthracite	20 00	Missouri	6 50
Iowa	6 50		

Philadelphia.

ANTHRACITE.

Broken, in the yard	$5 50
Egg and Stove	5 75
Chestnut	4 75

BITUMINOUS.

Pennsylvania and Westmoreland Gas	6 25
Broad Top	5 25
Powelton Sterling	5 25
Derby	5 50

75 cents per ton additional for delivery.

Pittsburgh, Pa.

Connellsville coal, per ton	$2 00@2 25
Youghiogheny, at Pittsburgh	2 25
Youghiogheny, at the mines	2 00
Coke on cars " "	3 25
Castle Shannon on Platform, per bushel	9½ c.
Anthracite, nut, per ton	per ton 7 25
" broken	7 50
" egg	7 50
" stove	7 50
" broken on cars	6 75
" stove " "	7 00

San Francisco, Cal.

From the *Commercial Herald*, March 12.

The market is very liberally supplied with Australian, and prices seem to favor the buyer. Anthracite is scarce, while Cumberland is very plentiful and cheap. Imports for the week include 1350 tonsBellingham Bay, Coast supplies continue liberal. We quote:

West Hartley, wholesale, ex ship,	per ton	$13 00
Wallsend, "	"	12 00
Australian, "	"	11 00@11 50
Coos Bay	"	10 00
Nanaimo	"	11 50
Bellingham Bay, ex ship	"	8 50
Mt. Diablo, coarse	"	8 50
" fine	"	6 25
Anthracite	"	16 00@17 50

St. Louis, Mo.

The market for coal rules rather dull at our usual quotations. There is some uneasiness among the miners, and several meetings have been held the past week. It now seems that the agreement made March 1st for the coming year will not be kept, as a number of miners are at work at less than the price agreed upon with the operators, and instead of four cents per bushel, the price first demanded, it is more than likely that three cents will be the rate for the summer.

Delivered in St. Louis 4 cents per bushel extra.

Delivered to railroads and mills by car ferry 2c. per bushel extra.

	Per bushel.	Per ton.
Illinois coal, retail at East St. Louis	9½ c.	$2 66
" " manufacturers	8½ c.	2 38
" " delivered	12@12½ c.	3 40
Big Muddy	14 c.	3 92
Trenton	12 c.	3 36
O'Fallon	9½ c.	2 52
Anthracite, delivered in St. Louis		$13 50
Missouri cannel, " "		6 50
Indiana cannel		7 00

Toledo, Ohio.

Scranton, all sizes	$9 00	Briar Hill	6 00
Lehigh Lump	11 00	Bituminous	4 50@6 50
Blossburg	8 50@ 9 00		

Halifax, N. S.

Sydney Coal, per chaldron	$8 50@ 9 00
Victoria " "	
Gowrie	7 50
Little Glace Bay	7 50
Albion (at Cunard's wharf)	7 50

Toronto, Ont.

	GOLD.
Scranton, all sizes, per ton, of 2000lb	$7 50
Lehigh prepared, " " " "	8 50
" Lump " " " "	9 00
Bituminous " " " "	7 50
Blossburg " " " "	7 00

Montreal, Quebec.

	GOLD.
Scotch Steam, 2000 lb. ex yard	$8 00@ 8 50
Lower Port, do	7 50@ 8 00
New Castle Grate, ex yard	11 00@12 00
Welsh Anthracite, per 2000 lb	9 00@10 00
English Coke	—@—
Lump Lehigh, per 2000 lb	9 00@—
Grate	10 00@—
Egg, American Anthracite	9 50@10 00
Stove, " "	10 00@10 50
Chestnut " "	10 00@10 50

Provincial Coals.

F. O. B. AT THE SHIPPING PORTS OF THE MINES.

	Prices in gold. Coarse.	Slack.
Block House, at Cow Bay	$2 25	$1 25
		Nut.
Gowrie	2 00	1 50
	Coarse.	Culm of Coal.
Pictou nett	$3 25	$
Sydney (old mine)	3 25	
Lingan	2 30	
Caledonia	2 25	
Glace Bay	2 25	

Freights from Cape Breton to New York have opened at $3 25.

Freight on Pittston Coal—From Newburgh.

By boats of the Pennsylvania Coal Co., per ton of 2240 lbs.

To Troy, Albany and Stuyvesant	60 c.
" Nyack and Hudson and Boston R.R. dock, Hudson, discharged to cars	50 c.
" Hudson, except as above, Rondout and Poughkeepsie	35 c.
" Catskill, at mouth of creek, Sing Sing, Tarrytown, Piermont, and Yonkers	55 c.
" Fishkill Landing and West Point	25 c.
" Peekskill, Haverstraw, Saugerties, and Barrytown	45 c.
" New York	65 c.

Freights.

PORTS.	From Georgetown.	From Baltimore.	From Port Richmond, Philadelphia.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken **
Albany	3 00	2 35	....	....
Amesbury, Mass	....	....	....	2 40
Bangor, Me	....	....	....	2 00
Bath, Me	3 00	2 85	....	2 00
Boston, Mass	2 75	2 75	2 50	2 00
Bridgeport, Ct	2 10	2 10	....	85
Bristol, Ct	....	....	2 00	1 20
Derby	2 25	....	....	1 10
Dighton	2 50	....	....	....
East Cambridge	....	....	2 50	††2 00
Fall River	2 15	2 15	2 00	1 20
Hackensack	....	....	....	....
Hartford	2 50	2 75	....	....
Hoboken	1 90	....	....	....
Jersey City	1 90	....	95	40
Middletown	....	....	....	1 25
Mystic	....	....	....	....
New Bedford	2 25	2 20	....	1 25
Newburyport	....	2 85	2 75	2 15
New Haven	2 15	2 10	....	85
New London	2 15	2 10	....	1 10
Newport	2 15	....	2 00	1 20
New York	2 00	1 90	¶ 95	§ 40
Norwalk	....	2 20	....	85
Norwich	2 50	2 15	....	1 15
Pawtucket	....	2 40	....	‡‡1 30
Philadelphia	1 25	1 05	....	....
Portland	2 75	2 75	....	1 90
Portsmouth, N. H	2 85	2 80	....	2 15
Providence	2 15	2 15	....	1 20
Rockport	....	....	....	2 10
Saco	....	....	....	2 40
Sag Harbor	....	....	....	....
Salem	2 75	2 75	....	2 00
Stamford	....	....	....	85
Stonington	....	....	....	1 10
Taunton	....	....	....	....
Warren	....	....	....	1 20
Washington	....	....	....	....
Wareham	2 70	2 60	....	....

*Towing from New York, 33⅓c. per ton.
‡ Under 150 tons, $1 per ton.
§ Under 150 tons, 50c. per ton.
¶ This is the rate alongside. Delivery on wharf costs from 16c. to 18c. additional.
** Shipping from Rondout the same as from Weehawken, the extra expense being borne by the D. and H. Canal Co.
†† Towing extra.
‡‡ 3c. per ton per bridge.

TOWING

FROM NEW YORK TO POINTS ON THE HUDSON RIVER.

	per ton.		per ton.
Manhattanville	8 c.	Haverstraw	17 c.
Spuyten Duyvel	9 "	Verplauck's Point	17 "
Yonkers	10 "	Peekskill & Newburg	18 "
Hastings	11 "	West Point & Cold Sp'g	20 "
Piermont & Dobbs Ferry	13 "	Poughkeepsie	22 "
Nyack & Tarrytown	15 "	Rondout	23 "
Sing Sing	16 "	Hudson	25 "
Croton Landing	17 "		

Boats of 100 tons and under—per boat.

Manhattanville	$11 00	Spuyten Duyvel	$13 00
Yonkers	15 00	Tarrytown	18 00
Sing Sing	20 00	Peekskill	20 00
Newburgh	25 00	Poughkeepsie	30 00

ON LONG ISLAND SOUND.

	per ton.		per boat.
Norwalk & Bridgeport	33⅓ c.	Port Morris	$20 00
New Haven	33⅓ "	West Farms, mouth of Creek	25 00
Derby ($50 per b't extra)	33⅓ "	West Farms	35 00
Southport & Westport	40 "	West Chester	30 00
Milford	40 "	College Point	25 00
Branford	45 "	Flushing & White Stone	30 00
New London	60 "	East Chester Town Dock	60 00
Middletown	65 "	New Rochelle & Glen Cove	50 00
Norwich	68 "	Mamaroneck & Port Chester	70 00
Hartford & Stonington	75 "	Greenwich, Stamford & Darien	75 00
Mystic	75 "		
	per b't.		
Harlem	$18 00		
Mott Haven	18 00		

To Elizabethport, full loads and return $18 00
To Port Johnson " " " 16 00
To New Haven or Bridgeport 75 00
Harbor Towing ranges from $4 50 to $6 00.

IRON MARKET REVIEW.

Import Duties.

The following are the duties in Gold on Iron:

Flat iron, not less than 1, nor more than 6 inches wide, nor less than ¾, nor more than 2 inches thick. *Round Iron*, not less than ¾, nor more than 2 inches in diameter, and *Square Iron*, not less than ½, nor more than 2 inches square ₱ lb. 9-10 of 1c.

Flat Round or Square Iron, of larger or smaller sizes than the above mentioned, per lb 1 35-100c

Provided, that all iron in slabs, blooms, loops, or other forms, less finished than bars, and more advanced than pig iron, except castings, shall pay the same as iron does.

Provided, that none of the above iron shall pay less than 31½ per cent.

Railroad Iron	63c. per 100 lb.
Boiler plates, or other plate iron not less than 3-16 of an inch thick, per lb	1 35-100 c.
Scrap castings per ton	$5 40
" wrought " "	7 00
Pig Iron per ton	6 30

Iron ore 10 per cent. *ad valorem*.

New York,

March 27, 1874.

American Pig.—Since our last report there has been no change in the state of the market. The Furnace Companies are generally very firm in their quotations, some asking as high as $37.00 for No. 1 Foundry. We are informed that the Lehigh Crane Iron Co., with a stock of about 2000 tons, will not sell at less than $36, while in exceptional cases there are those who will sell as low as $34. The general quotation may be fixed at $35. In other grades, most of the business is done at our higher figures. The transactions are hardly worthy of mention, mostly hand to mouth sales, and in the aggregate not equal to one good sale of ordinary times. We learn of the sale of 300 tons No. 1 Foundry, Lehigh, at $35, and the balance of sales are all reported upon private terms. The Crane Iron Co.'s and the Cambria Iron Co.'s Furnaces, are still out of blast, and no information of prospects of adjusting their troubles. The stocks are becoming quite large at many of the furnaces, and would permit them to make contracts for the future, if they were pleased with the prices now realized. We quote:

No 1, Foundry Anthracite	$34 00@36 00
No. 2, " "	32 00@33 00
Grey Forge	28 00@31 00
White and Mottled	23 00@26 00
Salisbury Charcoal Carwheel	62 00 — —

Scotch Pig.—As will be seen by the quotations below, there has been a decline of about $2 per ton since our last. This is the effect of news by cable of a decline in Scotland, and that prices there have a tendency to go still lower. It will require but a very slight decline in Scotch pig to bring it in very strong competition with American; in fact, the present quotations will have a tendency to very much liven the demand. Business is still dull, and but a few hundred tons have changed hands during the last week. Although we have had no further advices relative to the strike in Scotland, yet the decline would indicate that it could not have been a very serious matter. As will be seen by our British markets, there was to have been a general reduction on the 14th inst., which has undoubtedly created some trouble at some of the works, but, as we apprehenced, could not amount to much. We quote:

Glengarnock	38 00@ ....
Coltness	41 00@42 00
Eglinton	37 00@37 50

Iron Rails.—This branch of business is very dull, with but little enquiry and comparatively no transactions. We learn that the Troy Mills have closed a fair contract during the week, the particulars of which are private. We quote American at $59@60 at the works. English are nominal, with no transactions.

Bessemer Steel Rails.—There is no movement in Bessemer rails, and prices remain as quoted in our last, viz.: American at $103@105, currency, and English at about the same figures in gold.

Old Rails.—We learn of no transactions, and quote at $40@42.

Scrap Iron.—Nothing of importance doing. We quote wrought at $42 50, and cast at $28@32.

Scotch Pig.

Latest by Special Cable Report.

Tendency of the market downward.

Coltness	93s.	Eglinton	82s.
Carnbroe	88s.	Glengarnock	90s.
Langloan	90s.	Gartsherrie	90s.
Summerlee	90s.		

Boston,

March 21, 1874.

There is hardly enough business doing in either pig or bar iron to establish prices. Our quotations are nominally without change, as the offer of lower prices will not materially increase the demand. We quote yard lots of American pig at $36@$41, including No. 2 at $36@$38, and No. 1 at $39@$41; Eglinton at $45; Coltness at $48@$49; and charcoal at $50@$60.

Baltimore,

March 21, 1874.

The market for pig irons is very dull, and we have no sales to report. We quote: Scotch, $40, from yard; American anthracite No. 1, $33; No. 2, $31; and No. 3, $29.

Chicago,

March 23, 1874.

The demand is light, and much the same as reported a week ago. There have been no changes in prices since our last. We quote pig iron as follows:

No 1 Summerlee	$52 00@ ....
No. 1 Coltness	53 00@ ....
No. 1 Glengarnock	51 00@ ....
No. 1 Eglinton	50 00@ ....
No, 1 Lake Superior	50 00@ ....
No. 2 Lake Superior	48 00@ ....
No. 2 Tuscarawas	48 00@ ....
No. 1 Missouri	49 00@ ....
No. 2 Missouri	47 00@ ....
Union "A" 1 (Anthracite)	44 00@ ....
Union "B" 1 (Anthracite)	42 00@ ....

Cincinnati.

March 23, 1874.

The slight improvement noted in our last does not continue. The market during the past week has been very inactive, without considerable transactions in any grades. Prices are nominally unchanged. We quote:

HOT BLAST CHARCOAL.

Hanging Rock,	No. 1, per ton	$38 00@40 00
"	No. 2, "	35 00@37 00
"	Forge	30 00@32 00
Tennessee	No 1	35 00@37 00
Tennessee.	No. 2	33 00@35 00
"	Forge	30 00@32 00
Alabama,	No. 1	35 00@37 00
Missouri,	No. 1, Foundry	38 00@40 00
"	No. 2	35 00@37 00

HOT BLAST STONE COAL.

Missouri, No. 1	37 00@38 00
" Forge	30 00@32 00
Ohio No. 1, Foundry	33 00@36 00
Ohio Forge	30 00@31 00

COLD BLAST CHARCOAL.

Hanging Rock Car Wheel	55 00@60 00
Missouri "	55 00@57 00
Tennessee "	55 00@57 00
Kentucky "	55 00@57 00
Georgia "	55 00@57 00
Alabama "	55 00@57 00
Machinery and Forge	55 00@57 00
Blooms	100 00@110 00

Cleveland.

March 25, 1874.

C. E. Bingham & Co., dealers in pig iron and iron ores, report the market as follows:

Prices for pig iron remain unchanged, with little or no demand. We quote;

No. 1, Anthracite Foundry	$34 00@35 00—4 mos
No. 2, " "	32 00@33 50—4 mos
No. 1, Bituminous "	34 50@35 50—4 mos
No. 2, " "	33 00@34 00—4 mos
No. 1, Grey Forge Bituminous	30 00@31 50—4 mos
No, 2, Close Grey	29 00@30 00—4 mos
No. 1, Massilon Black Band	37 00@37 50—4 mos
No. B-1 " "	35 00@36 00 —4 mos
No. 2 " "	34 00@35 00—4 mos
No. 1, Lake Superior Charcoal	42 00@44 00—4 mos
No. 2, " "	39 00@41 00—4 mos
No. 3, " "	45 00@47 00—4 mos
Nos 4, 5, 6, " "	48 00@52 00—4 mos

Detroit.

March 23, 1874.

Scotch pig, net	$46 00@ ....
Lake Superior pig, No. 1	44 00@ ....
" " No. 2	42 00@ ....

Louisville.

March 23, 1874.

Pig metals are dull and heavy for the most part, and it would be difficult to move stocks without some concessions on asking rates. We quote:

HOT BLAST—CHARCOAL.

No. 1 foundry, from Hanging Rock ores			$40 00@41 00
No. 2 "	"	"	35 00@37 00
No. 1, forge,	"	"	32 00@33 00
No. 1, foundry,	" Tennessee	"	35 00@36 00
No. 2 "	"	"	33 00@34 00
No. 1, forge,	"	"	31 00@33 00
No. 1, foundry,	" Alabama	"	36 00@40 00
No. 1,	" Iron Mountain	"	41 00@43 00

HOT BLAST—STONECOAL.

No. 1, foundry, from Missouri ores			35 00@38 00
No. 2,	"	"	32 00@34 00
No. 1, forge	"	"	30 00@32 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock ores			60 00@65 00
"	" Tennessee	"	55 00@56 00
"	" Alabama	"	58 00@60 00
"	" Georgia	"	58 00@60 00
"	" Missouri	"	55 00@60 00
"	" Kentucky	"	55 00@60 00

Pittsburgh.

March 24, 1874.

Reported for the ENGINEERING AND MINING JOURNAL by A. H. CHILDS, commission merchant for the sale of pig iron, blooms, ore, &c.:

The pig iron trade continues in an exceedingly unsatisfactory condition, and sales have been effected only at reduced prices. During the past day or two there has been more inquiry for the better grades of mill iron, and some are inclined to take a more hopeful view. Foundry metal remains as dull as ever. Prices may be fairly quoted as follows:

No. 1, Foundry, anthracite or bituminous	$32 00@34 00—4 mos
No. 2, " "	30 00@31 00—4 mos
No. 1, Grey Forge, "	27 50@29 00—4 mos
No. 2, " "	27 00@ ....
White and mottled "	26 00@26 50—4 mos

The Pittsburgh *Commercial* reports the following sales for week ending March 21:

IRON MADE FROM LAKE SUPERIOR ORES, SMELTED BY BITUMINOUS COAL.

310 tons gray forge	$29—4 mos
300 tons gray forge at foundry	28—4 mos
250 tons gray forge	28—cash.
200 tons gray forge	29—4 mos
150 tons gray forge	29—4 mos
120 tons gray forge	29—4 mos
120 tons open gray	30—4 mos
20 tons No. 1 foundry	33—4 mos
10 tons No. 1 foundry	32—4 mos
10 tons silvery	27—4 mos
70 mixed lot	—p. t.

ALLEGHENY COKE.

600 tons gray forge	—p. t.

HANGING ROCK CHARCOAL.

43 tons No. 1 foundry	40@43—4 mos

Philadelphia.

March 25, 1874.

There are comparatively no transactions to note in pig iron, which is not quite so firm. There are no important transactions taking place in rails. We quote:

American No. 1	$34 00@35 00
American No. 2	32 00@33 00
American No. 3	29 00@30 00
Scotch—Glengarnock	39 00@40 00
" Eglinton	38 00@39 00
New rails, at works	59 00@60 00

San Francisco.

March 12, 1874.

There is very little demand for pig iron at present. American may be quoted at $43@$45 for hard and soft, while Scotch is nominally held at $43@$45 with but few transactions.

St. Louis.

March 21, 1874.

The market for pig iron has ruled dull for the last week, but no change in prices is noted. Prices for bar iron are firm, with a fair demand. Charcoal pig is firm. Shipments of about 19,000 tons of Missouri ores have been reported from March 1st to 14th inclusive. The receipts of pig iron by rail at this city for the same term amounted to 2,772 tons and the shipments 2,411. The Iron Mountain Company has taken orders during the last week for over 10,000 tons of ores.

HOT BLAST STONE COAL PIG.

No. 1 foundry from Iron Mountain and Maramac ores,	$34@35
No. 2 foundry from Iron Mountain and Maramac ores,	32@33
No. 3 forge from Iron Mountain and Maramac ores,	29@31
No. 1 Massilon,	43@..
No. 1 Tennessee, cold short,	36@..
No. 1 Ohio, cold short,	40@..

HOT BLAST CHARCOAL PIG.

No. 1 foundry from Iron Mountain and Maramac ores,	36@43
No. 2 foundry from Iron Mountain and Maramac ores,	32@40
No. 1 foundry from Tennessee ores,	35@37
No. 1 forge from Tennessee ores,	31@33

COLD BLAST CHARCOAL PIG.

Hanging Rock car wheel,	60@64
Tennessee,	58@60

MISSOURI IRON ORES.

Iron Mountain Co.'s Quotations.

Iron Mountain, per ton	$8 00
Benton Creek, "	7 50
Surface ores, "	8 00
Red and brown hematites, per ton	5 00@6 50
Pilot Knob, per ton	5 50
Rails, 50 to 60 lb. inclusive	70 00

THE BRITISH IRON TRADE.

LONDON, March 7, 1874.

Our advices for the week show no marked decline in prices. In some special instances there have been declines on both pig and manufactured iron, but the general market, although prices are tending downward, has shown no material change. Several of the districts show an increase of stocks. The Cleveland iron masters' returns for the month of February show an increase in stock amounting to 8,000 tons, making the total stock upwards of 101,000 tons. They report eight more furnaces in blast than at the same time last year, with an increase in production amounting to 13,573 tons. There was a decrease from January's production amounting to 10,259 tons. As wages in many districts have been agreed upon up to quarter day, there will probably be no material change in prices before that time. A better business is expected so soon as navigation fairly opens. Consumers are only placing orders for immediate necessities, thinking to be able to beat down prices with the iron masters later in the season. The prices of coal have a downward tendency in nearly all districts, and every decline of 1s. is equal to about 3s. on pig iron and 6s. on manufactured. Generally speaking, the mills and forges are doing a fair amount of work, also the foundries. From Sheffield and Attercliff we learn that the rail, plate and hoop mills are in full operation, and that for heavy armor plates there are some very heavy orders,

Very gloomy prophesies have been made in some sections relative to the competition to be met from Belgium, where the low prices are securing many orders which would otherwise have come here; and it is well known that they are competing at our very doors. In Wales, business appears to be very dull, but very little work being done, and makers rather despondent. Reports from all sections show that there is great activity with the Bessemer steel mills, there being no apparent falling off in the demand for rails, springs, tires and axles. In some sections the demand is so great, that the works are being extended to meet the increased call made upon the resources of the producers. At Sheffield, the demand for crucible steel is very light, as is also the case for cutlery. The usual Spring orders from America have not yet made their appearance. The following are the leading quotations: Cleveland No. 3 pig, 72s. 6d.@75s.; No. 4, 72s. 6d. At Manchester, No. 3 pig at 95s.@97s. 6d., and forge numbers 80s. @85s. per ton, delivered in the district. At Newcastle-upon-Tyne, No. 1 pig, 90s.; No. 3, 80s.@81s.; No. 4 foundry, 75s.@ 80s.; No. 4 forge, 1s. 6d less. At Darlington, No. 3 pig, 75s.; No. 4, 71s. At Dudley, all mine hot blast pig, £7@£7 10s., and cold blast, £8 5s. "Bradley Bridge charcoal," grey, £15; mottled, £15 10s.; white, £16. At Barrow, No. 1 Bessemer pig, £8; No. 2, £7 17s. 6d.; No. 3, £7 15s. At London, India charcoal pigs, £10@12. Rails are quoted at Darlington at £10 @10 5s.; at Cleveland, £10; in Wales, £9 5s.@9 10s.

Scotland.—The warrant market opened last Monday at 89s., which was the lowest point of the week, and closed yesterday at 95s. 6d., which was the highest point reached. The shipments of pig iron from Scotch ports during the week ending Feb. 28, amounted to 10,580 tons, being considerably more than in the previous week, but showing a decrease of 1,564 tons, as compared with the corresponding week of 1873. There is now a total decrease in the shipments since Christmas of 28,048 tons. The imports of Middlesbrough pigs at Grangemouth for the week were 3,370 tons, which shows an increase of 2,270 on those of the corresponding week of last year. There has been a reduction of 10s.@20s. on bars and nail rods, but its influence is not yet perceptible. The figures quoted above show a considerable decrease in the shipments of pig iron, and as there are only 117 furnaces in blast just now, against 120 last year, and a curtailment of demand, prices may, before long, touch 80s., a sum which would remunerate our iron masters if fuel and labor were brought into financial conformity. The Scotch iron masters have intimated that a reduction in wages will take place on March 14, but the sum is not specified. The fears that the men would meet the attempted reduction with a strike is the cause of the firmness in warrants. Very little alteration has occurred in the prices of the principal makers' brands, which are as follows: Gartsherrie, No. 1, 100s.; No. 3, 93s.; Coltness, 102s. 6d. and 92s.; Summerlee, 100s. and 92s.; Carnbroe, 96s. and 92s.; Monkland, 93s and 91s.; Clyde, 93s. and 91s.; Govan, 93s. and 91s.; Langloan, 100s. and 92s. 6d.; Calder, 100s, and 92s.; Eglinton, 92s. and 90s.; Dalmellington, 92s. and 90s.; Carron, 100s.; Shotts, 100s. and 92s. 6d.; Kinniel, 95s. and 91s.

METALS.

NEW YORK, March 26, 1874.

Gold Coin.—During the last week, gold has ranged from 111⅝ to 112¾, and closed to-day at 112⅝.

Bullion.—Fine silver bar, 127½@128½. Fine gold bar, ½ per cent. premium—$20 77 per ounce.

Copper.—There have been sales of 1,200,000 tons of Lake and Tennessee, bought mostly on speculation, at 24@24⅛c., cash; but to-day quotations are 24⅝@25c. The stock with consumers is quite small, and they are now purchasing rather freely. The London market, by cable, reports best selected, £88, and Chili bars, £77; on the latter there is a decline of £1 sterling. There is a much larger stock in Europe now than at the same time last year.

Tin.—The market is fairly active. About 2,000 slabs of Straits have been sold at 24@24⅛c., gold. The same, due in April, can be had at 24c. We quote English L. and F. at 21½@ 22c. on spot, and 21⅛c. to arrive and for shipment. Sales have been made of English refined at 23c. on spot, and 22⅛c. for prompt shipment from England. Billiton, 24@24⅛c., and Banca, 29½@28c., gold.

Lead.—There has been but little enquiry for foreign lead, and if forced upon the market, it would not bring above 6⅛c. The nominal quotation of selected is 7¼c., gold. Domestic is quoted to-day at 6⅛c. A small amount of business has been done since our last at 6⅛@6½c. The tendency of the market here and in London is downward.

Spelter.—Favorite domestic brands are quoted at 7¼@ 7½c., currency. The market is weak, although considerable business has been done at the above figures. We think a concession of ⅛c. could be secured. Foreign has declined. 80 tons Silesian were sold at 6½@6¾c., gold, which is the present quotation. Stocks are light, with but little to arrive. The market closes with considerable steadiness.

Zinc.—Sheet is quiet at 8¼@8⅝c., gold.

Antimony.—There is a very light demand at 12½@12¾c., gold.

Manganese.—The market is bare of the high grades which, if crystallized, would command 7c. per lb. Psilomelane or Virginia, and Georgia black oxide of manganese, sell, for 3½c. per lb.; lower grades, from 50 to 60 per cent., at 2½c.

Quicksilver.—The stock is very light, and the demand ahead of the supply. There is no Foreign being imported, as the prices paid here will not warrant it. The price in London is £19 5s @£19 10s.; in San Francisco, $1.25 per lb; and in this city by the flask, (76½ lb.) $1.33@$1.35 per lb.

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, March 26, 1874.

Our advices from the San Francisco Stock Board are dated the 24th inst. Without exception the list has advanced; the report is as follows:

Savage	95	Imperial	7¾
Crown Point	94	Raymond & Ely	28
Yellow Jacket	84	Meadow Valley	10½
Kentuck	24	Eureka V G	—
Chollar Potosi	69	Ophir	—
Gould & Curry	34	Hale & Norcross	—
Belcher	84		

Boston Stock Market.

BOSTON, March 26, 1874.

We annex the prices bid for copper stocks at the 1st session of the Boston Stock Market:

Allouez	7⅝	Pewabic	7⅞
Calumet and Hecla Co.	136¾	Phœnix	15
Copper Falls	24½	Quincy	37
Central	27	Ridge	6¾
Franklin	4	Rockland	1¼
Mesnard	1	St. Clair	2⅛
National	3¾	Star	1¾
Petherick	2⅛		

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues (ten dollars per annum) are payable on election and at the annual (May) meeting. Members and associates elected at the February meeting pay ten dollars only to May of the following year. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. The Council earnestly requests members to forward to the Secretary, for preservation, copies of all printed mining and geological reports, particularly pamphlets, which may fall in their way. It is believed that by this means a large amount of valuable fugitive information concerning different regions and properties in this country, may be caught and preserved.

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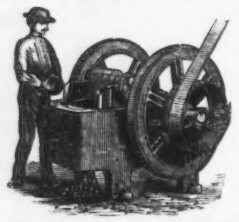

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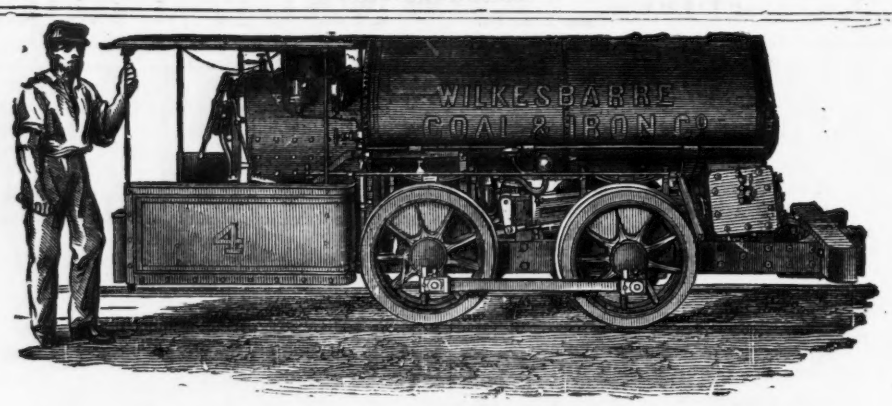

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